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The Farmer's Digest

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The Farmer's Digest

Volume 11 November, 1947 Number 6

Combines vs. Clover

Condensed from Successful Farming

C. J. Willard

EVERY change brings problems of adjustment. When the combined harvester-thresher moved east in the 1930's, it created problems which did not exist west of the Missouri River. Ask many farmers why they grow wheat or oats, and they will say, "I have to have a place to sow clover." Just saving the wheat is not enough: The clover must be saved, too.

It seemed likely that the combine, which leaves all the straw in the field on top of the new seeding, might affect the clover seeding differently from binder harvest. As the combine became more common, hay buyers began to complain about the large amount of straw in the hay from combined fields. Some farmers felt that stands of clover were better because of the protection of the straw; other careful farmers said their stands and yields were reduced.

In 1938, L. E. Thatcher, of the Ohio Agricultural Experiment Station at Wooster, got 1,150 pounds, or 17 per cent, less clean hay after combining than after binder harvest. And the hay following combine harvest contained 12 per cent straw.

We made tests over several years at Columbus. There was never a season in which cutting stubble and removing the stray did not result in better stands and higher quality hay than leaving the field untouched. Clipping the stubble without taking the straw off also improved stands and hay quality.

These tests led to a larger, more complete test, starting in 1942. In long, narrow fields, sown and combined as one area and with good stands of an alfalfa-clover mixture, we cut plots which compared the following treatments:

1. Leaving the straw as the combine left it.

2. Raking and removing the combined straw at once after combining.

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3. Cutting the stubble low at once after combining, leaving everything on the ground.

4. Cutting the stubble at once after combining, removing straw, hay and stubble.

Treatments 2, 3 and 4 were also repeated a month later, and plots with treatments 2 and 4 were given an additional clipping later, making nine treatments in all.

What happened? Pictures the next spring, and the yields, tell the final story. Where the straw was not touched, there was little or no clover left—except on thin spots in the field, where the straw was light. As a two-year average, these plots made just *half as much clean clover hay* as the best treatment, which was cutting the stubble and removing everything.

Where the combined straw was removed without clipping, the indicated average yield was 90 per cent of the best treatment, and there is evidence that it actually was higher than this.

Where stubble was clipped and everything left, average yield was 86 per cent of best treatment.

One's first impression is that the clover and alfalfa were simply smothered; that is, killed out by shading of the heavy straw. This didn't happen except where the straw was unusually heavy. Smothering is one factor in the injury from combined straw, but usually a minor one.

The clover and alfalfa began to die in September, and were practically gone by spring. While we are not pathologists, we can say there was every indication that the legumes died because the straw favored diseases similar to "damping-off."

This theory is borne out by our experiences in making summer seedings. A straw mulch applied at once after seeding, helps materially in getting stands of clover and other forages in the summer. However, when we compared mulches of 1, 2 and 3 tons of straw per acre, those of more than 1 ton resulted in seriously reduced stands the next spring, even where good initial stands were obtained. Here again, the effect was a gradual dying out.

The results from this test in 1947 promise to be even more spectacular, if possible, than the 1946 results. Two new things stand out from a study of these plots in April and May of 1947.

1. Alfalfa is more resistant to whatever it is that causes the death of alfalfa seedings. One plot, this year, had the right amount of straw so that most of the alfalfa was left alive; but 80 to 90 per cent of the clover died.

2. Whatever kills the alfalfa and clover is favored by *any* accumulation of organic matter in the late fall, whether the accumulation be from combined straw, growth of the clover itself, growth

of weeds and grasses, or a combination.

Plots which were clipped August 19 last year and all material removed have come through to this season with good stands.

It seems that here is an explanation of the frequent report that if clover makes seed the first year, it will be killed. We have repeatedly demonstrated that producing seed the first year does *not* kill clover. However, if it goes into the winter with a very heavy growth, it will be damaged as it is when there is heavy wheat straw on it.

On the other hand, when red-clover seed is harvested in the seeding year, it is usually done considerably after September 1. Cutting clover after September 1 is likely to result in winterkilling.

Our damage from combined straw has been more or less proportional to the amount of material left. Just a ton does little or no harm. This is very light straw, when you consider that there is from a third to a half ton of stubble left after the average binder harvest.

What, then, are we going to do with combined straw? The livestock farmer seldom has enough bedding, and so can cut the stubble at once after combining and remove the straw.

When you clip a new seeding, clip *low*—at normal hay height. Regardless of the height of cutting, the cut stem does not continue growth. Annual weeds recover from buds along the stem; hence the lower they are cut, the less they recover.

But lots of farmers don't need bedding, so that removing combined straw is an expense. What should a man do then?

He can rake and bale the straw for sale, or he can mow the field close at once after combining and leave the straw. Such clipping lets the straw down close to the ground. The clover grows up through the straw and it rots quickly.

How about selling the straw? Agronomists look doubtfully at any plan which takes organic matter from the land. The most important object of good rotation systems is to maintain and, if possible, increase the organic matter *in the soil.*

Where does selling straw fit in this picture? Does combined straw, left on the surface, increase the organic matter *in the soil?* Obviously *not,* if it kills out clover and alfalfa. These are the soil-building crops in the rotation; without them any rotation becomes soil-depleting.

The man who sells straw from the farm should be sure that he gets enough for it to pay for:

1. The labor and materials cost of getting it to market.

2. The cost of replacing the phosphate and potash sold.

Then if he actually *replaces* the minerals, he will be almost as well off as the man who leaves the straw, even if he does not save his clover. If he *saves* his clover, he will be far better off than if he had not sold the straw.

The amount of phosphate and potash to be replaced is considerable. Assuming a 2½-ton yield which is close to the largest yield one is likely to obtain, the straw from an acre may contain as much as 11 pounds of phosphoric acid, and 42 pounds of potash. At current prices, these amounts would cost about 80 cents and $2, respectively, or $2.80 per acre.

It is possible to sell straw from the farm and yet maintain organic matter and soil productivity.

To sum up:

1. Don't leave combined straw on new clover and alfalfa seedings—it does them serious injury. The more straw above a ton to the acre, the more damage.

2. As soon as possible after combining, if you can use the bedding, either
   a. Rake and remove the loose straw, or
   b. Cut the stubble low and remove everything.

3. If you don't want to use the straw on the farm, either
   a. Cut low as possible after combining, with the dividerboard removed, and leave the straw, or
   b. Cut the stubble low, bale, and sell the straw. When the straw is to be sold to the paper mills, it should include the stubble, which contains more fiber than the top straw.

4. If you sell straw, apply enough additional phosphate and potash to replace the amount of these minerals sold off the farm.

Benzene Hexachloride

Condensed from Hog Breeder

Common or sarcoptic mange in hogs has long been a headache to the swine producer. Mangy hogs are poor doers, expensive to feed and unsightly. For years the standard treatments have been: the use of lime-sulfur dips, crude oil, and various medicated mange oils.

The lime sulfur treatment was a nuisance because it had to be used at a temperature of 95° to 105° F. Maintaining this temperature while running a large number of animals through a dipping vat was a difficult problem in practice. Furthermore the pigs had to be dipped several times at 10 to 14 day intervals.

The crude oil treatment had the disadvantage that it also had to be applied several times. It is an extremely dirty job for the operator, and the treatment, especially with some oils, is hard on the animals. I have seen pigs almost blinded after two dippings in a water-filled vat on which 2 to 3 inches of oil was floated on the water. Furthermore oiled hogs could not be allowed in the bright sun without harm. Likewise oiling hogs in extremely cold weather was hard on the hogs. The medicated mange oils with which I am familiar are not as hard on the hogs as crude oil, but neither are they as effective against the mange mites.

Last year Doctor E. Hixson, chairman of the Entomology Department of the University of Nebraska, and Doctor M. H. Muma, Extension Entomologist, tackled the mange problem with a variety of materials, includng rotenone, DDT, benzyl benzoate, and benzene hexachloride. Benzene hexachloride proved to be the insecticide all hog men, who have ever had trouble with mange, have hoped for. It eradicates mange with one treatment.

The benzene hexachloride used in the tests was a vegetable powder of variable strength. In the tests conducted by Doctors Hixson and Muma, 17 herds of hogs consisting of about 700 animals were sprayed during the fall of 1946 and the spring of 1947. Two herds were sprayed with a hand sprayer, the rest were sprayed with a power sprayer, at a pressure of 200-225 pounds. The only failure in eliminating the mange with one treatment occurred when a hand sprayer was used and complete coverage was not obtained. To avoid this failure

Reprinted by permission from the Hog Breeder, August, 1947, Chicago, Illinois

one needs to use only a reasonable amount of care in applying the spray. Pen the pigs in a small pen so that they will mill about and climb over one another while being sprayed so that their bellies and flanks get well wetted. Also care should be taken to spray inside the ears of the pigs and between the hams.

On the basis of tests completed to date, the Nebraska entomologists recommend a solution with 0.25% of the gamma isomer of benzene hexachloride. This is equivalent to 20 pounds of wettable dust of benzene hexachloride containing 10% of the gamma isomer in 100 gallons of water.

With the cold wet spring which we had this year, plus the addition of some outside breeding stock to the herd, we had a rather severe outbreak of mange. These pigs were also lousy. Doctors Hixson and Muma obligingly sprayed these pigs shortly before weaning. At the present time these pigs are completely free of mange and also lice. It appears that the new miracle, benzene hexachloride, will not only eradicate mange, but hog lice as well. Truly a remarkable achievement. The hog men of the nation owe the Nebraska entomologists a debt of gratitude. The old treatments for mange control are now obsolete.

Quackgrass Killer

A tongue-twisting new chemical, available in commercial form for the first time this summer, promises to give excellent and economical control of quackgrass. The chemical, perfected by biological warfare specialists of the army, goes by the name *isoprophl phenyl carbamate.* You won't need to remember all that, however, as the commercial name is Quax. It is dusted on the surface of the soil, and then worked in so that it reaches the underground quackgrass runners. About 2½ pounds of the dust is said to be sufficient to treat a patch 10 feet square—Makon Chemical Company, Ann Arbor, Michigan.

Successful Farming

Got a Muddy Pond?

Condensed from Farm Journal

Do you have a pond in which the mud just won't settle out?

The remedy is easy, says William H. Irwin, zoologist at Oklahoma A. and M. College. Just dump in some barnyard manure. Or, if you'd rather, throw in some green hay, or even the weeds you mow off the pasture. Within two weeks the mud should settle out, giving you nice clear water.

If you have any fish, they'll do better in this clear water. The reason is that the sunlight can then penetrate to the bottom of the pond and let some plant life develop, on which the fish can feed. In a muddy pond, it's dark a foot or two under the surface.

Here's how the manure or hay works—it's a matter of electricity:

The fine mud particles that stay suspended in the water carry a negative charge, and won't settle as long as they have it. They keep this negative charge as long as the water has a certain degree of alkalinity. But when the manure or hay starts in to decompose it throws off carbonic acid. When the water becomes just slightly acid the negative charge on the mud particles changes to a positive charge, and the mud settles.

If your pond drains so much land that heavy rainfall flushes a lot of new water in, you may have to repeat the treatment. You can tell by watching.

It's possible to get too much organic matter in the pond. If you do, the oxygen will be used up, and the fish will die. However, this isn't likely to happen. Try some vegetative matter and see what happens, then throw in more in a couple of weeks, if necessary.

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Research Begins on the Farm

Condensed from The Rural New-Yorker

I. A. Daffin

Ever since the days of Darius Green and his flying machine, the garret inventor has been the butt of cartoonists' jokes, and many of his hard won successes have been regarded as flukes by less imaginative neighbors. However, once again the country has learned, both during the war and in the postwar application of new production equipment, that these inventors play a highly important role in our progress. Some of the most interesting labor saving devices placed on the market since the end of the war have been the conceptions of these workers. This is particularly true in the field of farm equipment, in which the trend toward mechanization lagged for a considerable period while it was spurting forward in manufacturing, transportation, communication and the general field of industry. Now agriculture is catching up and the next few years should see great strides toward complete mechanization on the farm. Much of the credit will go to independent inventors, tinkerers, as some call them, and much of it to the new turn toward invention which has developed on the farm itself among farmers who have felt most keenly that if agriculture is to be made attractive to the new generation, it must be relieved of a great deal of its drudgery.

None of this is intended to minimize the importance of organized research, but rather to stress the fact that one of our greatest natural resources is this body of mechanically minded men who are continuously searching for new methods and new machines and who help make the discoveries of better known scientific groups applicable to our everyday living. Even when they do not find the new machine, they are likely to be the first to find the bugs in it, and to show how they can be eliminated. The vast research organizatons supported by business, government and philanthropic funds have contributed great developments in recent decades. Due to these discoveries, some of us have begun to think of all mechanical and scientific progress in terms of mammoth laboratories, corps of highly skilled scientists and experimental equipment that costs into the millions. However, an

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unusually large number of new inventions and developments are the products of imaginative young Americans working at simple garret or cellar benches, with about the same kinds of tools as were used by a Whitney or a Bell.

At home the war pressure to discover more efficient methods of production was felt in all lines, from the little metal working shops and small farms to the largest industries. Much credit for increased efficiency is due to the many individuals who took their work home with them after a long day and returned with outlandish ideas which sometimes worked. Organized research alone could produce such tremendous developments as jet propulsion and atomic power, but these large organizations, intent on their assignments could not focus their attention on many smaller questions which were left open to the ingenuity of the so-called garret inventor.

Similarly, in the field of farm machinery, individual workers have come forward in the last few years both with ideas and practical demonstrations of equipment which have tremendous labor-saving potentialities. Anyone who has brought in hay with a fork and a wagon must have wondered if there could not be an easier way to do such a back-breaking job. Ed Nolt, of Lancaster County, Pennsylvania, was no different from others in that respect, and at the first opportunity he purchased what was supposed to be an automatic hay baler. On its trial run through the fields it became obvious that whatever else the machine could do, it could not bale hay, automatically or otherwise. Instead of complaining about his loss on the deal, he became angry because no one had invented a machine to fill his needs. He determined that if he couldn't buy an automatic baler, he would make one. With only the practical knowledge of a farm trained engineer, he set to work and made a self-tying hay baler that operated without a hitch.

Another outstanding example of ingenuity is offered by Price McLemore, of Montgomery, Alabama, who had puzzled over the problem of weed control in the cotton rows. Hoeing necessitated extensive hand labor and with the field hands already present it was hardly economical to use mechanical pickers. After the theory of flame cultivation occurred to him, McLemore went out with a blow torch to test it and then began to make a model of the implement as he pictured it. After the machinery was perfected, some of the first models were sent to the Louisiana sugar cane fields due to the importance of sugar in our war economy and the shortage of farm labor in that

locality. The results were so gratifying that many cane producers called flame cultivation a "must" to any future efficient operations. Recently, with the aid of his Sizz-Weeder, McLemore produced the first bale of entirely mechanically cultivated cotton at a cost encouraging to the other cotton growers of the South and promises to have a great significance in the future cotton economy.

Then there is a new potato harvester, which digs, cleans and sacks the potatoes in a single operation, and the bale loader, which lifts the bales from the ground to the truck. These are the inventions and developments of two Pennsylvania farmers who had no research organizations, but wanted to do these jobs more efficiently and with less drudgery on their own farms. They were Ralph Hertzler and Isaac Smoker, both of the highly productive farm area of Lancaster County.

There remain numerous farm tasks which today require drudgery and hard hand labor that could be mechanized to great advantage if suitable machinery could be designed. Many organizations are, of course, working on various of these problems, but I still believe that most of our farm equipment progress in the future will be based on the work of farmers and individual inventors, with their diversified and imaginative concepts which so often prove practical.

Edison, the father of organized research and invention, began as a garret worker and would have been the last to belittle the efforts of those who try to solve their own problems and make inventions as a result. The record points conclusively to the fact that an inventive mind can do things with such a small thing as a paper clip that most of us could not equal with a laboratory, completely equipped right down to a cyclotron.

"The Scottish Village"

Ian Finlay

It's rather a remarkable thing that in an island as small as Britain the countrysides of England and of Scotland are so different. I don't just mean different to look at. I mean fundamentally different—different socially, different in their economic set-ups. And very, very different for the purposes of the planners of today.

In English country life the focal point is the village. There are many sorts of English village. Some have grown up at road junctions, and they owe their importance to the fact that they are meeting-places of communications. Some owe their existence to a commanding position which made them good defensive points in the far-off past. Some were built to serve great castles. Some arose because of a fishing harbor. but all these sorts of village *grew*. They belonged to the countryside and grew out of it naturally, adding a bit here and a bit there as need arose, like living organisms adapting themselves to changing circumstances. In short, they grew gracefully. That's why the typical English village is such a lovely place, and goes on being such a lovely place until some city reaches out and takes away its reason for existing and eventually perhaps turns it into a mere dormitory suburb.

The typical Scottish village isn't like that at all. As a rule it's artificial—more like a little town dumped on to the countryside. And as a rule it is more like a town than a village in its origin. It may have grown up around a local industry, like the little woollen manufacturing places of the Borders or the villages which carried on linen manufacture in the eighteenth century, when that was the staple industry of Scotland. Or it may have started as a burgh of barony. The burghs of barony were set up by the barons to foster the marketing of goods, to their own advantage, of course, and you find them spaced out along the roads at intervals of several miles with no geographical or economic reason for being there. The royal burghs, strongly opposed by the burghs of barony, might in the same way have no particular reason for existing where they were; and in spite of the high-sounding name many of them were no bigger than large villages. Whether they originated out of industry or trade, they

were liable to decay if that industry or trade disappeared. An example of this is the little royal burgh of Culross, on the shores of the Forth. Culross had two healthy industries in the sixteenth and seventeenth centuries—coal-mining and the making of the iron girdles used for baking scones. Both industries died, and now Culross is a ghost of a village, a lovely ghost full of beautiful old buildings, but with streets nearly as silent as the grave. It died because it was not rooted in the undying life of the soil, on which man's life depends.

You may be wondering why it is that Scotland is so poor in those real villages that are still so much alive in England—why Scottish agriculture that is, does not produce villages to serve it as English agriculture does. Well, it's because the Scottish system of agricultural labor is so different. England is a country of yeomen farmers. That is, from time immemorial she had been divided into smallish farms, run by independent farmers. Those men were not wealthy. They did not own more than a hundred acres or so. They farmed those acres in a good, old-fashioned way century after century, getting what labor and services they needed from their nearby village, and because there were so many of them the labor and services needed by several of them could all be grouped together in that village. But in Scotland the Agricultural Revolution of the eighteenth century was a real revolution. The modern idea that big farms are a better economic proposition than small farms came in with a rush, and the Enclosure Act of 1696 put all the rich agricultural land into the hands of the lairds, who owned thousands of acres each. The little men who had owned a few acres had no longer any legal rights of ownership. They became mere hired labor. And by a pernicious system they were hired by the year. Because the farms were so big and the distances so great they had to live on the farms they worked for—lived often herded together in houses called "bothies." Even when, as married men, they had a cottage on the farm, it was theirs only for the year, till their hire was up. Next year they might move on or be moved on. The general result was in the most fertile parts of Scotland a landscape of magnificent great farms, farmed by methods far more modern than the English methods, but with no properly integrated social life. And the clearest evidence of this lack has been the lack of a healthy, happy village life. The great Cobbett at once recognized the fallacy of this wealthy farming without the parallel wealth of happiness in the countryside. He saw rich

stockyards and barns; but he saw none of the pretty cottages, the blooming gardens, the cheerful inns, the well-stocked commons or the churches that he looked for.

Let me say at once I don't want to give you the idea there are no beautiful villages in Scotland. There are the East coast villages—places with wonderful names like Pittenweem, Kilconquhar, St. Monans. They crowd round their tiny harbors with their quaint vernacular architecture, the stubby masts of the fishing smacks swaying right under their windows and the cornfields behind them yellow in the autumn sun. They are still alive because they subsist on the fishing. Or take Ullapool in the North West Highlands, with its whitewashed cottages strung out in a long line on the shore of Loch Broom, with the mountain mass of An Teallach keeping off the east winds and the gales from the Hebrides held off by Ben More Coigach. But there again the smell in the streets is the smell of herring and sea-tangle. There's Inveraray, with its white houses, eighteenth century houses, reflected in Loch Fyne, its windows winking back the morning sun at the blue hills of Cowal. That's kept its importance partly because the Courts of Justice come there on circuit. And there are charming little villages such as Corrie, on the Island of Arran, under the shadow of Goatfell, or the places tucked away in nooks and creeks of that Galloway coast where John Paul Jones first saw the light of day. They prosper because artists and holiday makers like to escape to their quiet. But none of them are properly-speaking rural units in the economy of the farming countryside.

This problem of the agricultural worker and the village in Scotland is very much in the forefront just now. It was raised in the House of Commons a few days ago. Various committees have brought out reports on the subject, and they strongly emphasize that workers should be housed in the future in or near the villages, not on the farms. For it is vitally important that they and their families should have the advantages, the services and social life, of the village community. So far so good. It is all very complicated, of course, because you've got to get your farm-workers from the villages to the farms, which may mean a bicycle ride of four or five miles every morning. But that is better than their wives having to go the four or five miles to a shop, and the children the same distances to school.

That, however, is only one angle of the problem. It's a vast problem, nation-wide; and, as I

see it, not only nation-wide but world-wide. It's the problem of striking the proper balance between town and country, and that's where this dearth of good, comfortable, live villages in Scotland is significant as a symptom of an unbalanced economy, an unbalanced economy which has spread half across the globe. I've told you how the Agricultural Revolution of the eighteenth century was the thing which frustrated village growth in Scotland. Well, that revolution began in Scotland, but it spread far and wide. Many countries have been up against the dustbowl menace for a long time now. What is the dustbowl but another symptom of the same disease that began by choking off the village life of Scotland? The disease is the notion that the countryside is just there to serve the interests of the cities and big business—the notion that the fields and pastures are simply there to put money in the bank. The dustbowl was the answer the soil gave to this monstrous cash-cropping policy—this policy of taking everything from the soil and putting nothing back. But the warning was written just as clearly over the Scottish countryside nearly two centuries before.

We don't get physical dustbowls here in Scotland with our equable climate and our plentiful moisture but in our maldistribution of population we're facing a sort of manpower dustbowl. In a way, we've the more difficult problem. The United States tackled the wilderness which overproduction had made of the Tennessee Valley—tackled it with tremendous energy and courage. But the whole of Scotland is *our* Tennessee Valley. If we're to get back our national health we've got to find a way of filtering back some of our population from the overgrown cities into villages and rural towns all over the country. We've got to find a way of giving artificial respiration to moribund existing towns and villages, and they've got to be towns and villages with roots to nourish them and make them grow healthily and flourish. Transferring the industries to such places and building the houses there for the workers—that's a big enough problem in itself, when you've got vested interests to fight and a shortage of materials to build with. Still, both those things can be done by resolution aand courage. Where the problem begins to get really tough is on the social side. You can't build a village out of jobs and houses only. You've got to build a community. It's one thing doing that on a desert such as the Tennessee Valley was. It's quite another grafting it on to an existing community that's going downhill and doesn't know it.

You may be wondering, what are the occupations to be for the new rural communities which Scotland hopes to create in her empty countryside? Well, in the Highlands there are the big hydro-electric schemes. If the electric power from these were "exported" mainly to existing industrial areas, obviously the schemes would produce no communities worth speaking of. It's essential therefore that the power should be used in the first instance to revitalize the countryside which produced it. Healthily balanced communities then might have the chance of growing up around the scheme, as they've done in the Tennessee Valley. Another occupation is forestry. This is a fine thing, and we want to see it progressing, but it isn't going to absorb a great population, as there are only three or four regions in Scotland capable of employing full-time foresters by the hundred. The proposed national parks may bring about a few villages, but again there are limits to the possibilities. The real solution of this rural problem seems to lie in putting new life into the existing agricultural system. That means not only more and better cultivation—and goodness knows we can do with all the foodstuffs we can grow. It means a better life on the land. It means building communities and the community sense, it means building more village halls and prettier cottages, it means building up a real love of the country again, it means re-rooting the people happily in the soil so the life of the city no longer has the power to draw them away. It's a huge and complicated problem; but the heartening thing here in Scotland now is that so many of the young planners realize what the problem is. They are planning with an eye on the village, not on the city. In these days that is a big move in the right direction.

Roofs for Farm Buildings

Condensed from Pennsylvania Farmer

R. U. Blasingame

Wood shingles, if made of durable woods, such as white pine, southern pine, cedar, redwood, or red cedar, make a good, low-cost, attractive durable roof. Sometimes they are impregnated with preservative and color which add to the attractive and durable qualities of a wood shingle roof. Many people say that wood shingles should be laid on slate rather than on solid sheathing. They think that wood shingles should "breathe" in order to extend their life. However, Architectural Graphic Standards, by Ramsey and Sleeper, published by John Wiley and Sons, shows cypress, red cedar, redwood and white pine shingles laid on waterproof felt on solid sheathing. They say that this method is more windproof and provides better insulation, but is not so lasting as the strip type. It is recommended that nails for wood shingles be dipped galvanized white metal or zinc coated.

Wood shingles come in bundles of 250 equivalent to 4 inches wide. They may vary in width from 2½ to 14 inches and are 16 inches long. Green shingles should be laid with a spacing of ¼ inch apart and dry ones ⅛ inch. This is to take care of expansion and contraction in wet and dry seasons. It is recommended that wood shingles be fastened with two nails about ⅝ inch from each edge and 6 inches from the butt. It is usual to lay wood shingles with 4-inch exposure on ¼ pitch roof and 5 inches on full pitch. These shingles are not used on roofs of less than ¼ pitch.

Galvanized roofing generally comes in V-crimp, standing seam, corrugated, pressed seam and ribbed seam. In some sections the most popular types of galvanized roofing for farm structures are the corrugated for barns and standing or pressed seam for dwellings.

The standing and pressed seam galvanized roofing should be placed on a solid sheathed deck on asbestos felt. This roofing is commonly held in place by 12 to 14 inches on centers (O.C.). Possibly the standing seam is the most waterproof of all types of galvanized roofing.

V-crimp is made in two, three and five crimps. For 6″ to 12″

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pitch use five crimps and for roofs steeper than this use two or three crimps. This roofing can be laid on wood nailing strips. It is possibly best to use strips two inches thick rather than one inch. The thicker strips spaced 3 feet apart hold better under stormy weather than 1-inch strips.

It is best practice to use galvanized nails with lead washers driven into the top of the corrugation or crimp to prevent leakage around the nail. Then there is a zinc paint which can be used as an extra protection to nails and very light coated sheets.

The lasting qualities of galvanized roofing will depend somewhat on the protective coating of zinc it receives. The Zinc Institute has made extensive studies to determine the optimum quantity of zinc (Spelter) to apply to metal sheets for satisfactory service. This research indicates that two ounces of zinc per square foot has been adopted as the standard. In order that farmers may know that they are getting this standard, the "Seal of Quality" is stamped on high class galvanized roofing. Beware of roofing not carrying this seal of quality.

Bituminous roofing comes in several types. Possibly the simplest type is felt impregnated with tar commonly known as "Tar paper" or roll roofing. It is composed of heavy felt passed through a vat of hot tar or asphalt. Roll roofing or composition shingles may be made of one, two or three layers (ply) of this tar paper. Sometimes it is left plain and again the weather surface is covered with mineral granules.

Roll roofing is usually used on roofs of ¼ pitch or less. As a rule it is laid horizontally when placed on flat roofs. Then on steeper roofs it is laid up and down the slope.

Roll roofing is not so well adapted on open sheds. In case it is used on this type of building be sure it is laid on solid sheathing and well nailed down. High winds have a tendency to blow roll roofing off of open sheds. This roofing comes in rolls 36 inches wide with 108 sq. ft. in each roll, which is a square (100 sq. ft.). The extra 8 sq. ft. is used to lap over and cement the joints.

Composition shingles usually come in strips of four shingles each, being 12⅜″x9″ or 12⅜″x 36″. From 100 to 136 strips are required per square.

There are two general kinds of tar paper. One type is rosin-sized on one side. This kind of paper is used under tin roofs on top of the sheathing with the rosin side next to the tin. This is advisable because the unneutralized acids of tar paper may corrode the tin. Tar paper is commonly used under asphalt shingles and under siding. This makes

a building warmer in winter and cooler in summer.

Asbestos shingles are manufactured by compressing Portland cement and asbestos fiber together under high pressure. These shingles, if uncolored, are drab in appearance. However, color is often added to a veneering on the exposed surface by the use of mineral pigments in the body of the shingle or by pressing colored slate or other materials into the exposed surface.

Asbestos shingles are fireproof and durable, but they weigh up to around 500 pounds per square. Thus the roof must be designed to take the extra load over most other kinds of common roofing. These shingles may be laid in three common styles. Dutch lap, American rectangular, or hexagonal French.

Aluminum roofing has come into common use (when available) since World War II. Here are the instructions for laying aluminum roofing sheets:

1. Place first sheet at lower corner away from prevailing storms, allowing 2″ overhang at eave and not less than 1½″ at gable. Both edges of side corrugations to be down on 2½″ corrugated sheets and gable edge down and inner edge up when using 1¼″ corrugated sheets.

2. Nail across bottom of first sheet about 1½″ up from bottom edge of roof sheathing at eave or about 3½″ up from bottom edge of roof sheet. This row of nails to be on crest of every other corrugation on 2½″ corrugated sheets. After starting one nail on this first row near the bottom of the first sheet, start one nail near the top edge of the first sheet to keep the sheet in line until the second sheet is fastened. When second sheet is fastened pull the nail in the top of first sheet.

3. The second, third, fourth sheets, etc., are side lapped two corrugations over the previous sheets for 2½″ sheets and 1½ corrugations for 1¼″ sheets.

4. Nail all side laps on crest of first corrugation, spacing nails about 12″ center to center. Nail all end laps about 2″ up from the bottom of the sheet on the crest of every other corrugation on 2½″ sheet and every third corrugation on 1¼″ sheet. Do not nail top edges of any sheets on any course, as the nails through the bottom ends of the next course and through the ridge roll will fasten down the top edges of all sheets.

5. Proceed across the roof with the first course and leave at least 1½″ overhang at the gable end. If it is necessary to slit the last sheet in the row to allow the 1½″ or more overhang at the gable, lay the sheet flat on a piece of lumber and using a 2″x4″ as a

straight edge scratch the sheet deeply with the point of a sharp knife at the proper location. Bend the sheet at the scratch and the sheet will split.

6. Start second course the same as the first course, allowing the bottom edges of the sheets in the second course to lap 6″ over the top of the sheets in the first course.

7. Last course is laid the same as previous courses only the top ridges of the last courses on both sides of roof should come together at the ridge. Lay ridge roll and nail through the skirt of the ridge roll at top of every other corrugation for 2½″ sheets and every third for 1¼″ corrugation.

8. The 1½″ or more overhang at the gables can be bent down at any time after the sheets are nailed and nailed about 4″ center to center on the face of the outboard rafter. Do not bend roofing too sharply. Use a short piece of 2″x4″ and a hammer to do the bending, running the 2″x4″ back and forth a few times so all parts of the overhang will come down about the same time.

CAUTION

Drive the nails until the nail head touches the sheet and holds it firmly to the roof, but do not over-drive as this will dent and bow the sheet.

Under-driving the nails lets the sheets rattle. Over-driving the nails makes an unsightly job, prevents a tight fit at the side laps and roof is liable to leak at the nails.

Use tin snips to cut across the sheets if necessary.

Use lead headed galvanized steel or aluminum nails. Heads of aluminum nails should be at least 7/16″ diameter and shanks should be barbed. Nails should not be less than 1¼″ long.

Galbestos is a relatively new material. It is produced by coating sheet steel with zinc. While this zinc coating is still in the molten state, asbestos felt is pressed onto it. The fibers of the felt are squeezed into the molten zinc, which in turn is securely bonded to the steel core sheet. To increase the waterproof qualities of the protective asbestos felt layer, it is impregnated with a special asphaltic solution. The impregnated asbestos protected sheet is then given a tough, heavy waterproof outer coating which further resists corrosive influences.

"The steel-to-zinc-to-felt bond is so tight that the layers on both sides of the steel core sheet blend into a single, unique, new material—Galbestos."

This material is resistant to weather and will stand smoke and other industrial fumes.

Garfoil is still an innovation in roofing. It consists of a coating

of what is called "Supercote" on your old roof. Then a thin layer of aluminum is put on top of the Supercote. On top of the aluminum, still another coating of Supercote is applied. The aluminum is very thin and will conform to the inequalities of the roof. It will not rust or rot and will stand the ravages of the weather.

In addition to the kinds of roofing materials mentioned above there are many others, such as slate, clay tile, tin, copper, zinc, lead and canvas. While these materials make excellent roofs they are not so commonly used in farm structures as some of the others which have been discussed in detail.

Reroofing. Often metal or asphalt shingles are used to reroof over wood shingles. In case of metal it is usually applied over strips of wood 1″x2″ placed horizontally. This provides an air space under the metal to take care of condensation which may collect there and cause rapid decay. In reroofing over an old roof be sure to use nails long enough to reach through to the sheathing beneath.

Fertilizer

A slow-acting nitrogren fertilizer that feeds crops over a long period has been developed by soil scientists of the United States Department of Agriculture. It is a combination of urea and formaldehyde known as Uraform. No commercial supply is yet available.

Tests so far indicate Uraform is superior to natural organic materials in supplying nitrogen at a uniform rate over a long growing period. Unlike nitrogen fertilizers now available, Uraform does not leach out of the soil easily. It is expected to be of special value for corn and potatoes.

Successful Farming

Acid Metabolism Vital to Plants

Condensed from California Cultivator

R. E. Stephenson

SOLUTIONS, such as the juices, and the protoplasmic contents of plant cells and the cell walls in contact with these solutions, always have some degree of acidity or alkalinity. Normal plants contain both acids and bases. Acids, such as lemon juice, which is practically citric acid, and bases, such as soda ash, have opposite properties, so that one neutralizes the other. This soda ash, a base, and muriatic acid placed together in just the right amounts produce an end product that is neutral, a substance which we know as common salt.

There are a great many different acids and alkalis or bases that affect plant growth, some coming from the soil and some synthesized by growth processes. Plants seem to be so adjusted, however, that the acids predominate and nearly all plant juices and living plant materials show an acid reaction. Therefore, plants are, by nature, adjusted to an acid metabolism, the degree of acidity varying in different plants and in different parts of the same plant. The degree of acidity is gradually reduced as the plant matures or the fruit ripens. Green apples, which are sour, become quite mild and pleasant when fully ripened due to loss of some acids and the change of some of the starch to sugars.

The more common acids in plants are citric, malic, tartaric, oxalic, acetic and carbonic. All vital processes and the essential behavior of the growing plant, are influenced by and adjusted to the presence of these acids. Only a few of the acids occur in one type of plant, however. The degree of acidity determined in part by the kind of acids is likewise regulated by natural processes so coordinated and organized that the plant functions as a harmonious whole. Only under abnormal conditions, as when a plant is grown on a soil seriously unsuited, is the metabolism of the plant likely to be completely upset.

In common practice, a great deal of attention is given to the acidity or alkalinity of the soil to provide a favorable reaction for the crops that are grown. Recently, it has been accepted that outside of the extremes of acidity and alkalinity, reaction of the soil is of much less direct importance to the plant than the nutrient supply. To some extent the plant

Reprinted by permission from California Cultivator, March 15, 1947, Los Angeles, Cal.

modifies soil reaction to make conditions more favorable for growth. Soils well supplied with all essential nutrients in available form will probably produce good crops in spite of acidity, unless some physical property such as lack of drainage and aeration, is causing a nutritional upset. Too often, however, acid soils are also deficient in available nutrients.

The fine feeding roots of most agricultural plants which are in contact with moist soil, are bathed with a thin moisture film that is acid in reaction and controlled by the plant. The nutrients needed by the plant are in solution dissolved by the acids of the moisture film. This moisture film is made acid even in soils which are neutral or somewhat alkaline by the rather copious amount of carbonic acid given off by the roots of the plant.

The cell walls of the root hairs and fine feeding roots of the plant are also acid. This allows essential nutrients to pass through the cell walls in solution. Likewise the protoplasmic membranes just inside the cell wall are acid. Inside the plant cell, the sap of the plant is still more acid. The proteins of the protoplasmic contents of the cells are also mild acids. The degree of acidity is regulated in part by the quantity and kind of organic acids produced by the plant and in part by those meterials obtained from the soil which tend to neutralize the internal acidity. Considerable oxalic acid is neutralized in plants by calcium supplied by lime forming insoluble calcium oxalate. A heavy limed soil, for example, may result in the plant absorbing so much calcium that the internal plant acidity is reduced to the point where chlorosis is produced, because iron or some other essential nutrient is thrown out of solution inside the plant cells, thus interfering with its circulation to those parts of the plant where the particular nutrient is needed for growth.

Plants show not only different degrees of internal acidities, but also difference in adjustment to the acidity of the soil. Acid-loving plants commonly have a high internal acidity and may be injured if grown in soil that is alkaline in reaction. Alkaline soils tend to reduce the internal acidity of the plant below the optimum for plant growth. Plants which do not thrive except in soils that are near neutral need the elements supplied by the soil that tend to reduce the internal acidity. Acid soils must be limed for these plants. The type of acids within the plant in part controls its adjustment to the soil. Any soil which interferes with the normally acid metabolism of the plant will not be well suited to production of that particular crop.

Acidity in the guard cells of the stomatal opening in the leaves determines whether the stomata remain open and receptive to carbon dioxide from the air or whether they are closed. The acid which controls the acidity of the guard cells is carbonic, the most variable acid found within the plant. The amount of carbonic acid in the plant varies with the opening and closing of the stomata and with the use of the carbon dioxide for photosynthetic activity, which takes place in daylight but ceases in darkness. Thus clouds, sunshine and darkness play a part in stomatal opening and the growth of the plant. Except when the stomata remain open, not much carbon dioxide can enter the leaf tissue. Without carbon dioxide, photosynthesis stops and, therefore, there is little growth and consequently an unsatisfactory harvest. Thus acidity in the guard cells of the stomata may indirectly control the harvest.

A certain degree of acidity is necessary to keep the cell walls plastic so that growth by cell stretching can occur. Thus all growth processes are closely related to the acidity of the cell contents.

Many plant processes, such as the change of starch to sugar, are controlled by the activity of enzymes, which are probably contained in every plant cell. The rate of synthesis of sugar and the respiratory processes are other activities controlled by enzymes. These enzymes are active only in the presence of certain degrees of acidity, which differ for different enzymes and in different parts of the plant.

Plants also contain many hormones which in some way regulate growth processes. These growth promoters are stimulated or inhibited according to the acidity of their cell environment.

The metabolic health of the plant is closely related to the acidity of the soil and the acidity of the plant sap. Anything which disturbs the normal acidty of the plant may render it more susceptible to disease. Bacterial diseases are less prevalent among plants with highly acid juices. Fungous diseases are not inhibited by any acidity common to plants but any vigorous plant is less susceptible to disease, however.

The quality of the crop as well as the yield is affected by acidity. The flavor of food plants is closely related to the degree of acidity of the juices. A certain degree of acidity gives a palatable tang. More is unpleasant and cannot be sweetened with sugar. The degree of acidity may influence the succulence of plants. Acidity in the juice determines whether the fruit is best suited for jelly or jam. Without enough, or with too much, juices refuse to

jell. Commercial pectins used to improve jelling, modify the juice to a suitable degree of acidity. The smoking quality of tobacco is influenced by the acidity of the tobacco. That which is adjusted to the right acidity for good smoking, must be kept tightly sealed or some of the organic acids are oxidized and the tobacco deteriorates in quality. Even the flavor of coffee may be influenced by internal acidity.

Flowers contain a pigment which manifests a different color with different degrees of acidity. A red rose may become blue if the acid is sufficiently reduced. In nature, however, the acidity cannot be much reduced without injury to the plant. The various hues of autumn leaves are in part due to different degrees of acidity that influence the pigmentation of the foliage.

A living plant, therefore, is a highly organized chemical system with many and varied chemical changes being made simultaneously. For the most part, these processes take place in the presence of acids, most of them organic and synthesized by the plant itself. Some of them may be waste products of metabolism. Some are partially or completely neutralized by basic elements taken from the soil or sometimes by bases synthesized by the plant. These partially neutralized acids make up the buffer system of plant juices, and these in turn control the enzymes and hormones which are the regulators of growth and life processes. Thus the plant world is one in which acids play a dominant role.

Soils in humid climates are normally somewhat acid but this may be of little concern if the supply of available nutrients is adequate. Severe soil acidity is usually associated with nutrient deficiencies. The same processes that develop soil acidity are responsible for nutrient deficiency, and lack of available nutrients may limit plant growth in acid soils. Sometimes a high degree of soil acidity may bring toxins, such as aluminum into solution and plants which are sensitive to the toxins will not thrive. Extremes of alkalinity are of course injurious to plants. Black alkali soils are nearly worthless.

Soils which are near neutral or only slightly alkaline, usually have a greater abundance of available plant nutrients. Due to nature's adjustment of the plant system, the root feeding zone from which the plant obtains nutrients may be maintained at a favorable reaction for ready nutrient availability in a wide range of soils. The normal metabolism of many plants is good without too close a control of soil reaction. Nature, over the centuries past has made this wise adjustment to a variable soil environment.

One-Man Milking Plant

Condensed from Capper's Farmer

WILL your barn put you out of the dairy business? It could happen. It has happened to other folks. But they didn't blame their barns. Labor shortage was more logical. Still, most of them had crew barns. That's the kind that requires a lot of help to operate.

R. Keith Larzelere had one. He dispersed a good Guernsey herd out of it. Draft and wartime industry took his crew. He couldn't operate alone. So labor scarcity was his reason for selling. But if he had owned a different kind of barn—

Last fall he was building a new barn in Kalamazoo county, Michigan. It was so different that he was troubled almost as much by curious visitors as by scarce meterials.

Larzelere had held back enough heifers to grow a new herd. While they were developing he pondered the hazards that would confront renewed, full-scale production. Labor overcast the vista like a shroud. Dairy barn design, he concluded, must be changed radically.

Maybe his new milking plant wouldn't be the complete answer to the crew barn. But at least it was a departure from the conventional liability in cow housing. Also he had planned it for one-man operation. If he had to sell another herd it wouldn't be for lack of help.

The main structure is 40 by 120 feet with arched roof supported by glued, laminated rafters set on a 40-inch casement base. There is not a post to obstruct the interior and the haymow extends to the ground. Larzelere didn't see the logic of spending money to support his hay high in the air when the ground offered a sound foundation. Also he refused to condemn himself forever to climbing upstairs to throw down hay. The storage is adapted to loose, baled or chopped hay without alteration.

On each side of the mow is a 20-foot leanto, and in front a 24-foot shed, all walled by concrete blocks. The whole is roofed with sheet metal. Over-all width of the barn is 80 feet and the length 144.

The interior is arranged for loose cattle housing and compartment milking. The leanto sheds provide loafing space. They are connected at both ends by 10-foot

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driveways which give access to either shed and a turn around from one to the other. This arrangement provides for mechanical loading in cleaning out manure. It also affords pens for milked and unmilked cows.

Along each haymow wall is a concrete manger. Dry roughage will be tossed into mangers between the mow rafters. Silage will be distributed from a track carrier with sliding trap door in the bottom.

In the front shed he provided space for a cold room, a milkroom, a shop and calf pens. Between them and the main barn and just back of the milkroom are the 6 milking stalls. The stalls were staggered, at an angle of about 22½ degrees to afford easy entry and exit for cows. Also they were set on a platform 32 inches high. That puts sponging and stimulating udders, milking and machine stripping at pocket height. Why stoop to milk?

At milking time, cows are shunted into one of the loafing sheds. Gate controls within easy reach of the operator's station will admit them to the stanchions. As the cows are milked they are released into the opposite side of the barn.

Some men criticize the milking-compartment system because of the time required to get cows into the stalls. But with an arrangement such as Larzelere has, experienced dairymen contend cows learn to come in without prompting. And they will establish their own order—boss cows first and more timid ones later. They won't vary much in the order from one milking to another.

In any sizeable herd the fast-milking routine is aided by a helper so that the machine man can stick to his job without interruption. And even with the chore-saving features of Larzelere's plant, a second person would speed the chore. But it is by no means a crew barn and should necessity require he can get along without help. He doesn't contemplate sacrificing another herd.

Sheep Dog Trials

Condensed from The Ohio Farmer

D. S. Bell

CONTESTS to earn the rating of superiority in any field have always appealed to the American public. Sheep dog trials are not any different from many others in this respect, but they go further by testing each dog, under uniform conditions, at the work any good dog should be able to perform on the farm every day of the year. When a good dog is sent to gather and fetch its sheep it doesn't take long for any sheep grower to compute the miles of walking and running a good dog can save in the course of a year.

As the dogs start into the second phase of work on the trials course, driving—both directly away and horizontally across the field—the time saving value of a good dog in moving sheep or other livestock is obvious. When the third phase of work comes up—penning the sheep without any help or assistance whatever from the handler—the worth of a good dog around the barn and stock pens is clear.

Trials a Popular Feature

Sheep dog trials are not a new innovation. Ever since 1873, when farmers and shepherds first met at Bala, Wales, to put their dogs in competition such trials have been a popular feature throughout most of the sheep raising world. The number of trials held each year throughout Britain, South Africa, Australia, and New Zealand is now legion, and when the final event each year in each country is called to declare the supreme champion in the sheep dog kingdom it is almost equivalent to a national holiday.

Trials for sheep working dogs were first introduced into North America in conjunction with the International Sheep and Wool exhibition held at Philadelphia in 1880. Following this introduction, however, trials were not carried on, likely for the reason that there was no organization to develop and sponsor them. From time to time an individual here and there gave exhibitions at fairs and other gatherings of livestock folks to show the phenomenal work of the talented shepherd's Collie.

The principal outcome of this development was that farmers and livestock growers got the

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impression that such dogs were exceptional canines developed especially for exhibition work and handled by an individual of rare dog-training ability. They didn't suspect that any farmer who sought to understand the rudiments of training a dog and who would exercise reasonable patience could have an equally faithful and capable working dog.

For the benefit of those who are unfamiliar with the trials course it should be said that the man and dog take up their position at one end of the field. The man holds this position and directs the dog by whistled, spoken, or motioned command; the handler not assisting the dog in any way. The five sheep (and five are many times more difficult to control and handle than is a larger group) are placed at the opposite end of the field which is not less than 200 yards from the handler. The dog is sent out around these sheep with the object of bringing them in as near a straight line as possible to the handler.

To do this job perfectly the dog must run wide of his sheep, circle in beyond them and come up on them on the opposite side from the handler. To go straight is a bad fault because it makes it possible for the sheep to run to the far end of the field and in the opposite direction to the one desired. The object is to get the sheep as quickly as possible with the least commotion and the least running of the animals possible. Excessive running and exertion is undesirable.

If the dog has made a perfect outrun he will have located himself beyond the sheep almost without their being aware of his presence. Next comes the introduction of dog to sheep, and the manner in which the dog introduces his presence often determines the dog's success or failure from this point on. If the dog is rash and abrupt in making his presence known the sheep, like as not, will be startled, or even frightened, and will perform in a wild running manner during much of the time they are under the dog's care.

If the dog is calm, composed, and resolute, the sheep seem to settle down in confidence and all the work is done without fuss or fear. The latter kind are the ones desired. The whole object is to determine working dog qualities and select those that do their work sedately. With the introduction made and the sheep started quietly (this phase of work being called "lifting" the sheep), they are then brought in as near a direct line as possible to the handler. The bringing of the sheep is called the "fetch."

With the sheep at hand the dog next undertakes to demonstrate

it's ability to drive sheep. Off to the left of the handler's position two hurdles are set so that an opening between them is made which is 10 feet wide. This can be likened to a gate in yonder pasture field and the dog's job is to drive the sheep through the gate. This gate is set up 70 yards away; the handler, of course, holding his position. The dog only has one try at this gate and if the sheep go through or go by the gate, the dog is next required to drive the sheep horizontally across the field and make its attempt to put the sheep through a second gate which is 75 yards away from the first gate and also 75 yards from the handler's position.

This reads like a heavy assignment and it is, but most of the best dogs will accomplish this work. Untrained dogs, flighty dogs and rash working dogs seldom do—the end effect is that the best dogs give a splendid exhibition of sheep, dog and man cooperation and the others reveal their weakness.

After the dog has had its try at the second gate the handler proceeds to an 8′x8′ pen with a gate opening on one side. Here he takes hold of a rope 6 feet long and continues to hold to this rope (a means of restricting the handler's movements) while the dog, which has by this time brought up the five sheep, proceeds to force the sheep into this pen. The work is done entirely by the dog and workers lose points if the man lends any physical assistance in getting the sheep into the pen.

The qualities of work revealed by the dog in attempting to pen sheep are many. There must be concentration, intensity, instant response to command, care and caution, and that uncanny inherent ability which gives truth to the statement that sheep dogs are bred and born to their work. Training is the art of educating a well-bred sheep dog to do its work properly. No amount of training can make an ordinary dog into a sedate working dog with those superior essential qualities. These must be bred into the dog, and trials are a means of testing to find out which dogs have and which do not have the maximum of the good qualities.

As American farmers and livestock growers learn to understand and appreciate trials they will soon catch on to what goes with dogs of ability and with those with less precise qualities. It is all a matter of testing good dogs to find the superior as a means of breeding better dogs for the better handling of livestock.

Group Riding in California

Condensed from The Horse

Robert O. Foote

GROUP riding is a tradition of California which is not being allowed to fall into neglect. In the days of the Dons, the horse was the only means of transportation; today he may not be so necessary, but is just as popular. Early California witnessed many parades of horsemen and horsewomen, journeying perhaps fifty or a hundred miles from one rancho to another for a wedding or a fiesta. Today, there may be seen rides of as many as a thousand horsemen crossing hills and valleys—purely for pleasure.

Unlike the rides in many sections, these are undertaken, at least in Southern California, solely for the joy of the jaunt. There are some competitive rides, but these are chiefly confined to Central and Northern California. One of the first was instituted in 1940 in the Merced-Mariposa ride, a four-day expedition that leads over a 100-mile route into the Yosemite Valley. The Yuba-Sutter county ride of 54 miles, with carefully scored points, is another important competition, and there are others scattered about. One of them is up Mt. Diablo, the landmark of the San Francisco Bay Region.

Down South, as the Californians call all that section of the state below the Tehachapi Mountains, the group riding is more intensely for sociability and for getting out into the country where the automobile is a rarety rather than the rule.

Sometimes the rides are by little cliques who have established their own tradition of monthly or yearly gatherings, taking along pack animals for penetration of the deeper mountains.

Sometimes as many as a thousand riders participate, with camp sites set up at regular intervals, supplied by trucks that take the long way round while the riders go over the hills—the horsemen covering a leisurely 25 miles while their supplies are carried a hundred, to reach the same destination.

To the advancement of California riding, a start has already been made which eventually will result in a California Master Loop Riding and Hiking Trail, reaching from the Mexican border to the Oregon line. Last

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year's Legislature appropriated $300,000 to get the project underway; eventually $2,000,000 will be expended upon it. The route will follow the Western slope of the Sierra Nevada Mountains at an approximate elevation of 2,000 feet, and then return, from either end, near the Pacific shore, in the foothills of the Coast Range.

This Master Trail will have links in every county, to reach scenic spots. It will avoid, so far as possible, country that also is traversed by auto roads. Overnight camps eventually will be constructed every 20 or 30 miles. Work already has been started in laying out connecting links between existing sections in Los Angeles county, while trails already in use will be quickly worked into the system in the well-developed counties around San Francisco Bay, such as Contra Costa, San Mateo, Marin.

Credit for obtaining the appropriation and getting a start on the Master Loop Trail is due to the lively California State Horsemen's Association, which has 12,000 members in 125 clubs; "posses;" breeders organizations, and other bodies devoted to the advancement of equine interests.

By all odds the best known, most picturesque group ride held annually in California is that of Los Rancheros Visitadores of Santa Barbara. Strictly a stag affair, it attracts men of prominence from all over the country. Frequently a governor of an Eastern state, or a big-town banker will bring along a score of friends, to be mounted in California and accompany the Visitadores. Lawyers, doctors, stockbrokers, writers, artists arrange their vacations to coincide with the Santa Barbara ride.

Los Rancheros Visitadores live up to their name, which is obviously "visitors to the ranchos." On their first night of a gorgeous week in the saddle they assemble at the beautiful *Juan y Lolita* Rancho of El Presidente John J. Mitchell in the hills back of Santa Barbara. Some years they are blessed, as they start, by the padres of Santa Barbara Mission. Sometimes that ceremony is performed at Santa Ynez Mission in the oak-studded back country. Each night camp is pitched at a different rancho of one of the horsiest sections of the Golden State. On the Saturday of ride-week a rodeo is held with both professionals and amateurs participating.

Less well known, but equally picturesque, is the annual ride of De Anza Caballeros of Riverside, San Diego, and Imperial counties, an organization formed shortly before the start of the war and now resuming operations. About 100 men take part in the Caballeros' week-long expedition, with several hundred more riding out

to welcome them home on the final day.

Notable was their ride of last year, when they actually followed so far as possible the original trail of Capt. Juan Bautiste de Anza, who, in 1774, was the first white man to explore the interior of Southern California.

The party assembled at and started from Plaster City, near the Mexican line, crossed the desert on a 38-mile first-day ride to Ocotillo. That was a real test of man and mount, one for which they had been conditioned by a month or more of training. Thence the Caballeros worked their way by 25-mile stages back to Riverside, holding quarter-horse races on the final day at Lakeview, and then joining their wives in a banquet. On this ride of 156 miles paved roads were crossed but three times, showing what primitive country was penetrated.

Another popular group ride is the Pines-to-Palms affair which ends up at Palm Springs each spring, as a feature of the Desert Circus.

Akin to these long rides are the one-day affairs like the Chino ride, or the Highways-to-Romance two-day rodeos.

The Californian gets about both on and with his horse, to take in such affairs. It is, of course, necessary for him to be equipped to transport himself and his animal long distances. So the horse-trailer has become part of the tack of practically every owner in California. He and his horse think nothing of a preliminary motor trip of one or two hundred miles before starting out on the trails.

Super 2, 4-D?

Michigan State College scientists have recently discovered what may be a practical method of greatly increasing the weed-killing power of 2,4-D. They have used a concentrated juice of onions mixed with 2,4-D. They report the weed-killing potency is increased from 10 to 20 times. Extracts from some other vegetables have been tried, with varying results.

Successful Farming

10 Point Health Program

Condensed from Poultry Tribune

Dr. T. C. Byerly

Senior Poultry Husbandman, USDA

A HEALTHY, well-fed flock of pullets bred to lay eggs at a rapid rate is an important source of income on the general farm and the foundation of commercial egg production.

Good early-hatched, healthy, well managed pullets of the more popular varieties and crosses should produce 50 eggs each before the end of the year in which they were hatched and 200 eggs each during their first laying year. Pullets that produce that many eggs are usually profitable.

Disease loss in laying birds and loss in egg production caused by disease *reduce* production and profit in many laying flocks. Laying flock mortality for the country as a whole varies from about 15 to about 20 per cent. Loss caused by reduced egg production due to disease is probably at least as great as that caused by death of laying birds. Total disease loss in laying flocks in 1946 was certainly at least $150,000,000.

While there is no one practice nor any group of practices which will guarantee the laying flock against disease loss, there are practices which will reduce loss in most cases. Some of these are shown in the accompanying flock health guide.

FLOCK HEALTH GUIDE

1. Buy healthy day-old chicks, either from a hatchery operating under official supervision or one which you know enforces a rigorous disease prevention program. Insist that the chicks be delivered in clean, new boxes. Bring no poultry into your flock other than day-old chicks or other newly hatched poultry.

2. Brood the chicks on clean ground not used for poultry the previous year. Clean and disinfect the brooder house and equipment before starting the brood. The brooding location should be at least 200 feet from any other poultry. Disease organisms may be carried through the air on dust particles for short distances.

3. Vaccinate against fowl pox and laryngotracheitis when the pullets are 6 to 12 weeks old, but *only* if these diseases have occurred on your farm or are prevalent in your community. Chickens

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should not be vaccinated while they are affected by coccidiosis, colds, or other diseases.

4. House only healthy, well-developed pullets. Poorly developed pullets are likely to lay fewer eggs and to be more susceptible to disease than those that are vigorous and thrifty at housing time. It is a good practice to rear at least 25 per cent more pullets than you intend to house so that the poorer birds may be eliminated.

5. House the pullets in a clean house, with deep dry litter, separated from all other poultry by at least 200 feet. If you have just one laying house, sell all your hens at least a month before you house your pullets, clean the house thoroughly, and disinfect it before housing the pullets.

6. Give the pullets at least 3 square feet of floor space, give them plenty of good feed, plenty of feeder space and clean water in clean utensils.

7. Cull birds which are out of condition just as soon as they can be recognized. Kill chronically and seriously sick birds.

8. Keep all visitors out of laying house and insist that any necessary service men use sanitary precautions to avoid bringing disease into your flock.

9. Burn or bury deeply (a good disposal pit is convenient) all dead birds on the day they die.

10. If disease appears in your flock, get veterinary diagnosis locally or at yaur state laboratory just as soon as possible and follow the advice of qualified disease specialists.

All infectious diseases of poultry are transmitted from one bird to another by the causative agent gaining entrance to a susceptible bird. Housing pullets with old hens may expose susceptible pullets to diseases carried by apparently healthy hens. Birds sick with an infectious disease eliminate the infection through the secretions and excretions, including nasal discharges, and droppings, contaminating feed, water and litter, and other birds with which they come in contact. The sick bird itself is the most common cause of the transmission of disease.

The first step in disease control is to keep the healthy flock segregated from sick or carrier birds and from materials contaminated by such birds.

The *second* step in disease control is the cleaning and disinfection of all premises, equipment, materials, and personnel that has come in contact with diseased flocks, before such facilities are used for healthy flocks.

To clean a poultry house, first sprinkle the interior to reduce

dust, remove all equipment, including roosts, then scrape and sweep all dirt from the floor, walls and ceiling. Scrub the house with hot, soapy water.

Spray the interior with a solution made by dissolving one pound of commercial lye containing 94 per cent of sodium hydroxide and 2½ pounds of water-slaked lime in 5½ gallons of water. The solution should be strained through a fine wire screen to remove particles of lime which might otherwise clog the sprayer. The white residue on the surface will indicate spots that have been covered. A cresylic disinfectant, such as liquor cresolis saponatus, 4 ounces to the gallon of water may be used instead of the lye mixture described, or sodium orthophenylphenate 4 ounces to the gallon of water may be used.

The equipment should be scrubbed and disinfected with either of the last two mentioned disinfectants. Disinfection should be done several days before the pullets are housed.

In addition to sick and carrier birds and materials and equipment contaminated by such birds, people who handle poultry, trucks, crates, feed bags, wild birds, rats, mice, and cats are other means by which disease may be spread from a diseased to a healthy flock. Rid your premises from rats and mice, preferably through the use of one of the new and highly effective rodenticides which should be used exactly as directed by the manufacturer.

Rot-Resistant Potato

Commercial potato growers are keeping a watchful eye on test acreages of the new Teton variety this year, for it has already shown high resistance to ring rot in widely separated, commercial potato areas. Though not yet in commercial use, the Teton showed only a 3 per cent ring-rot infection in Maine tests, as compared to 68 per cent infection for Green Mountain potatoes, and 80 per cent for Katahdins.

Successful Farming

How Ocular Demonstrations Lead to Improved Farming

Condensed from New England Homestead

L. F. Easterbrook

Agricultural Correspondent of the "News Chronicle," London

FOR the first two years of World War II it was my duty to try to persuade farmers in Britain to undertake cheerfully tasks that were more or less unfamiliar to them: to make silage, for example, and grow corn where there might have been grass for a generation or more. It was an intensive experience, and, whatever it may have taught them, I learned quite a lot.

The first thing it showed me was that the farmers, like country people all the world over, take things in through their eyes rather than through their ears, and that the written word is the least likely to stimulate action. They listened to lectures and talks and no doubt they went home and thought about them. We showed them films and these seemed to make more impression than any written matter we circulated to them, but even after the showing of a film on silage-making, things seemed to hang fire, somehow. In one way, the written matter was the least effective of all. We reduced the material to the simplest language and framed it in colloquial terms. Sometimes we demonstrated points with pictures and diagrams. But we were not really getting anywhere.

Then, in May, 1940, we organized a stage demonstration on someone's farm. We had real grass and real silos, a man who really knew all about it to do the talking, and a real gang of men making real silage. We advertised in the local papers and asked the farmers to come.

The result was a revelation. They came from miles around, and it was surprising how many pulled out little screwed up bits of paper from their pockets and said to the demonstrator: "Look, I've had this." "This" would be one of our leaflets on silage-making. They had read it and had kept it, and it had not been so unsuccessful as we had feared. It

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had acted as a kind of can-opener to let the thought of silage into their minds, but in a very large number of cases it needed ocular demonstration before they would really go and make silage.

This discovery led us into what proved to be one of the most successful of all ways we found of encouraging second-rate farmers to study and apply the methods used by better farmers. A farm was selected where a first-class practical man, farming for his living, was getting good results. His neighbors were invited to come on a certain day and have a walk round. The farmer would take them round, explaining just what he was doing and why, and technical experts from the County Agricultural Committee were "on tap" to answer any more abstruse questions or give the scientific explanation of what the farmer might be doing simply in the light of practical experience. Arguments and discussions would spring up spontaneously among the company, sometimes becoming quite heated, and then we knew that the real progress of education had begun. The whole process of passing on knowledge became lubricated by the sense of a social occasion. Neighbors and friends met together in this friendly atmosphere, and usually it was possible to end the proceedings with tea and a bun, or refreshments of some kind. The "Technical Demonstration," as these affairs were rather clumsily called, became as popular as it was effective, and quite a feature of the life of the countryside.

It was applied in the first place to arable farming and grassland management, when it was so necessary in war time to make the most of the all too few acres available. But later we began to realize the need to improve the grade of the animal side of our husbandry and make the small commercial dairy farmer more interested in getting better cows and bulls. This meant a slight adaptation of technique.

A farmer with a good commercial dairy herd would be chosen and asked to cooperate, which they were always willing to do. A first-class judge of that particular breed of dairy cattle would then be engaged. He came down and spent the morning going round the herd, making notes on each animal, in readiness for the demonstration in the afternoon. Farmers from all round came to this, perhaps a couple of hundred of them. A ring in the field behind the farmhouse was roped off: The judge and a chairman of the meeting were in it, perched in a farm cart with a microphone laid on. The chairman opened the proceedings with a short talk on the importance of good cows, the part played by the bull, the need to have milk in his pedigree,

and then usually a little bit about how the nation was looking to the dairy farmers for all the milk they could supply to sustain its health and strength through the rigorous days of war. It would be a practical talk, but it did link the farmer's daily life and bread-and-butter with the needs of the community. This was important, for it is so easy for a man with a few cows tucked away in some rather remote farm to forget that he is important to the nation when multiplied by perhaps 100,000 others like him.

Then the farmer's animals were brought into the ring one by one while the judge went over their points. He would say which bull had sired them, and it was instructive to see how often the bull had imprinted his stamp unmistakably on his progeny; and he would stress any bad points quite as much as the good ones. (It was necessary, of course, to find a herd owner in the first place sufficiently good-humored and public-spirited not to mind so frank a commentary. We found as a rule that the better the farmer the less touchy he was of such criticism.)

Again the results came up to our best expectations and enabled the less adept class of dairy farmer to gain a grounding in the characteristics of a desirable dairy cow while sparing him any direct accusation of such elementary ignorance.

These experiences proved the value of ocular demonstration, but it does not mean that it is a substitute for lectures, talks, films and the written word. All these things serve to awaken the mind and bring the realization that certain problems exist. They are useful, also, to sustain interest and encourage the seeking of more knowledge after demonstration has, so to speak, established the whole thing on practical and realistic ground. But what the ocular demonstration seemed to do was to provide the final stimulus to action, and make the hesitant farmer feel that here was something that really could be done, and be done by him. Not the least important factor in this was the knowledge that it was being done already by a fellow farmer, in business for his living, and not just by "one of those experts."

Correcting Herd Faults

Condensed from The Shorthorn World

L. M. Winters

Author of "Animal Breeding"

It is a wise man who is able to recognize the defects in himself, his organization or his work. It is likewise a wise breeder who is able to recognize the defects in his herd. Another way of putting it is that one cannot be a constructive breeder unless he possesses the ability to recognize the defects in his herd. To do this one must be coldly critical of his own handiwork.

It is of great importance, however that the constructive breeder be able to recognize the superior points or characteristics of his herd. If he cannot do this he very likely will lose the desirable features of his herd even more rapidly than he gained them.

Before going into a discussion of procedure there are a few fundamentals that need to be stressed: The animal becomes what it becomes by virtue of the possibilities it inherits from its two parents. It inherits these possibilities in two small packets, known as germ cells. Within the germ cells are chromosomes and on the chromosomes are genes which are the units of inheritance. Either your herd has or does not have genes for certain desirable traits. If it has them then there is no need to go elsewhere for them. But if your herd hasn't got them then you need to go out and get them because there is no known method of making genes to order, or for that matter of making genes. It, therefore, amounts to this; it is necessary to have a genetic background that allows for whatever development is wanted.

Let us now assume that we possess a herd that as a herd is strong in all respects excepting fullness of the hindquarter. The logical thing to do would be to purchase a sire that possessed all the good qualities our herd possessed and in addition was full in the quarter. And it would be best if that bull came from a herd that was strong in all respects. That, however, is usually like asking for Utopia. And if one did find such an animal in such a herd the chances are so many others would be after the animal that the price would be prohibitive. The second best choice then

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is to purchase an animal (male or female) that is strong in the quarter and backed by a family strong in their quarters but that possess as few other faults as possible.

If the new animal is a female there is only one logical method of procedure and that is to mate her to the best herd sire on the place and continue this practice until she drops a good bull calf. After the good bull calf is grown out he should be used as a herd sire. It will be well to use him rather lightly the first year in order to make certain that he is not going to have a bad effect on the herd. Once it becomes clear that some of his calves are superior in the quarter and still superior in most other respects he can be used heavily.

If we now have a crop of calves coming on, a fair percentage of which possess good quarters and are good in other respects, we are ready for some breeding from within—the use of sires from our own herd.

At this point, let us return to our purchase of an animal from the outside that was strong in the quarter. If this animal is a bull then we proceed somewhat differently, in fact we may proceed in one of several ways. One way is to use him on the entire herd or on as many cows as he can handle. This is the gamblers method. If we are lucky it is fine but if we are not in luck then it is too bad. We must remember that in the beginning we made the assumption that we had an outstanding herd but a herd that was weaker in the quarter than we felt tolerable. Such being the case, we need to exercise as much care to preserve what we have as to make a further improvement. Perhaps that could be put even a little stronger, it is more important that we preserve what we have. For this reason I prefer to use the new bull on a limited number of animals the first year or two until I am certain what he will do to the herd.

If our new bull does not improve the offspring then there is only one thing to do with him and that is get rid of him. If he does improve the herd so that we come closer to our ideals, then the thing to do is to use him as heavily as possible. We now have reached the point where we have a young herd coming on that is outstanding in overall merit, but because of a recent outcross we have reason to believe that the members are far from pure for their desirable trait. Here we have two possible methods of procedure, perhaps we should say three, but I am going to reject the third so we will give that first. It is to hunt for another sire that will "nick" with the superior herd we now have. This is the popular method of procedure and you can pick up no end of "Cock and

bull" stories as to how to pick them so they will nick. The odd fact is that no one can pick them to nick repeatedly unless he is dealing with two or more highly purified lines and has had previous experience as to how the lines will cross. Since we have very few lines of this kind in livestock this method is out.

We still have two methods left and the choice depends largely on circumstances. If the original herd, before we brought in our bull with the full quarters, was especially good I would use the "backcross method." By the backcross method I mean I would have a young bull of my own breeding coming on to follow up on the daughters of the bull purchased to improve the quarters. The reason for doing this is to concentrate and thereby preserve the breeding of my original herd. In like manner if I had a number of females that were not sired by the heavy quartered bull, I would mate them to a son of this bull that was out of one of my best cows. The principle involved is to bring in this outside "blood," genes, and yet cause as little disturbance as possible to my own herd. This general method could be continued for two or three generations, each time being especially careful to select individuals with superior quarters as well as their being superior in other respects. After this I would breed from within indefinitely being especially careful at all times to select outstanding individuals and individuals with good records of performance.

We still have another method, it is more of a gamble, but under certain conditions it is the preferable method. With this method I would interbreed the half brothers and sisters by our heavy quartered bull. By so doing I would expect to produce a crop of calves more variable than by the method mentioned above. From this crop or crops, I would hope to find some that were outstanding. These would then be the basis for my improved herd. The bulls could be used on not only the improved heifers but on some of the other stock that was not quite so superior. The superior individuals, especially the bulls, produced by this first round of inbreeding would mark the new pivot spot for our improved herd. I would continue to operate around this pivot until the herd had thoroughly absorbed the good it should have received from use of our heavy quartered bull.

If after several generations it became clear that the herd still needed some improvement, I would go out and hunt for another animal of outside breeding as outlined for the first introduction of outside breeding. If, however, I was pretty well satisfied with my herd I would be very

slow to introduce outside genes into the herd. I would breed from within but I would be rather careful not to concentrate too rapidly. You can breed a herd of cattle from within for a long time without raising the inbreeding a great deal, if you are careful. The use of several sires is one of the best methods of holding down the advance of the inbreeding. Another method of holding it down is to mate the extremes of bloodlines within the herd. This has the additional advantage of bringing the herd closer together both in type and in breeding.

In general we have been more fearful of inbreeding than need be. Inbreeding, however, like any tool, needs to be used for the purpose it can serve. Its purpose is to aid us in retaining what we have. It does this in two ways; one is by revealing what we have, and the other is since no new genes are introduced we keep what we have—provided we select carefully. If, however, we do not select wisely, we may very rapidly lose what we have. This point is not always realized, but inbreeding classifies our material; it brings out and develops various types. If, then, we do not retain the right ones we will lose rather than gain by the procedure.

The above outline of procedure takes a long time to correct one fault in a herd. Constructive animal breeding is, however, a long time job; it is a lifetime job. The above outline has been general rather than specific. Not long ago I had two breeders of large superior herds come to me for advice. Each wanted me to give him something of a formula that he could follow. I am afraid I disappointed them because I told them I had to know a good deal about their herds before I could offer advice.

The good M.D. doesn't give many prescriptions on the basis of telephone examinations; he looks his patient over rather carefully. In much the same manner the correction of herd faults requires a careful examination, not only of the faults, but of where the breeder desires to go with his herd. Does he want to make it just a good herd, or is he prepared to pay the price in time, care and, yes, even money to make it an outstanding herd? All these matters need to be taken into consideration. It is much like coaching an athlete. The coach trains the men in fundamentals, but when the men go out to play they must use some ingenuity depending on what they encounter. And that same principle applies in livestock breeding.

No Flies in Iowa

Condensed from Extension Service Review

Ned Disque

Assistant Extension Editor, Iowa

IOWA didn't swat flies last summer. Citizens of that State eliminated flies with DDT and destroyed their breeding places in an all-out organized campaign.

Nearly all of the State's 99 counties participated in the work under the direction of county extension directors. Cities and towns in particular organized thoroughly along lines suggested in a test campaign conducted in the city of Ames and five other towns in the State last year.

"The amazing thing about this program is that it really worked," reported I. W. Lackore, secretary of the Ames Chamber of Commerce, at the conclusion of the fly season. "We achieved nearly 100 per cent control of flies, both in business sections and residential areas.

"Householders who cooperated reported the fly swatter was never needed; that they saw only one to six flies in the house during the entire summer. It was really an event if a fly was seen."

The Ames fly-control campaign was a city-wide affair carried on by the public safety and welfare committee of the Ames Chamber of Commerce. The committee met with Dr. Harold Gunderson, of the Extension Service of Iowa State College, to learn proper procedure in fighting the fly and to get an estimate of the cost of the work.

After adopting a budget to cover a complete program of fly, roach and rodent control, the committee solicited funds.

The plan of operation called for spraying all food-handling establishments once on the interior with a 5 per cent solution of DDT xylene emulsion.

Exteriors, alleys, garbage cans, doorways were sprayed every two weeks with a 2½ per cent wettable powder solution.

Equipment included a power sprayer similar to those used for spraying trees, and small, 3-gallon, hand-operated sprayers.

The Chamber of Commerce carried out a complete spray program in business sections only. Advertisements were run in newspapers and handbills distributed to householders asking for their

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cooperation. Materials were available at dealers.

When the cost of the campaign was figured it was found that the expense of a fly-free city for the first year was $688. This included $472.25 for material, $151.21 for labor, and $64.54 for equipment. After deducting the cost of the material on hand it was figured that the net cost to the city was $400.

State-wide plans this year were complete in every detail. The State Department of Public health cooperated with the Extension service in the work.

First local meetings for organization purposes were held in March and April. The ground work was laid in the elimination of fly-breeding spots.

During the week of March 5-9 district spray schools were conducted at nine different cities scattered through the State. Extension personnel were on hand to show how to mix and how to apply DDT.

Scores of commercial spray outfits operated through Iowa towns and on Iowa farms this summer. Individual spray operators numbered in the hundreds.

Other Iowa towns were convinced that if Ames could enjoy freedom from flies, they could, too.

Gains from Silage

It takes a little more than a ton of corn silage to put 100 pounds of gain on steers, no matter how much rain there is in the silage.

That's what they've found at the Ohio Experiment Station in 15 years of tests.

In 1936, drought cut the silage yield to 3.7 tons per acre, and there were only 4.2 bushels of grain per ton of silage. Yet it took 34 pounds less silage per 100 pounds of gain than in 1942, when the corn crop went 11.3 tons to the acre, and carried 7.3 bushels of grain to the ton. The steers gained just as rapidly, too.

Farm Journal

From Swamps to Pasture

Condensed from The Michigan Farmer

L. S. Pope

Reed canary grass—a succulent lowland pasture that likes wet feet—may soon become the most important forage crop in Michigan. Farmers all over the state are turning their swamps and bottom land into productive pasture. Michigan has 5 million acres of muck land, most of it lying idle due to heavy spring floods. Cattails, willows, and marsh grass claim some of the most potentially productive land in the state.

That's where reed canary grass enters the picture. In two years a worthless swamp is capable of pasturing three cows to the acre.

It takes a lot of moisture during the summer months to keep reed canary producing. It prefers low spots, water-logged most of the year, where it can draw on an unlimited supply of moisture. It quickly takes hold in muck soil, spreading a thick mat of roots and rhizomes over the spongy surface which will furnish solid support for livestock.

Reed canary seed is dark and oily—slippery to the touch. The thin coat of oil resists moisture damage and allows the seed to remain in cold, damp ground for months without spoiling.

The plant spreads both underground, by creeping root stocks, and above ground through seeds. This means that it can be pastured closely and still maintain itself. New shoots come up each year to replace the old ones that die out, even if the plant is never allowed to go to seed.

August is usually the only month when farmers can get on their marsh land with the equipment necessary to fit a seedbed. Big caterpillar tractors and marsh breaking plows are often used to turn under reeds, sedges and undergrowth.

Most of the half-rotted stumps and logs, thrown to the surface by the plow, must be removed before a seedbed can be fitted. A good way to get rid of them is to haul them to higher ground to be burned.

Seedings of reed canary grass do best when the land is well-fitted. Not all stands are established under such ideal conditions, however. One farmer near Ypsilanti scattered his reed canary seed from a rowboat, on a

Reprinted by permission from The Michigan Farmer, Aug. 16, 1947, Detroit, Michigan

marsh too soft to support anything solid and under water most of the year.

Two years later, he returned to the same spot with a tractor and power mower, and proceeded to cut the field for hay. The tough mat of roots spread over the quagmire supported the weight of the tractor. Observers said the entire bog shivered and shook with the movement of machinery.

The best time to see reed canary is during the early spring months. On some marshes, this is impossible.

Next best time is in late summer, from August 15th to September 1st. A light mixture of timothy helps in spreading the reed canary seed, and takes up the slack while the reed canary sod is developing.

From 4 to 6 pounds should be broadcast to the acre. Drilling the seed means a coarser stemmed plant. Cultipack the field after broadcasting. This will bury the seeds at the proper depth, ¼ to ½ inches.

Successful seedings can be made in the late fall, after the ground is frozen, also in late March before the ground thaws. Mother Nature, through her freezing and thawing action, will bury the seed sufficiently deep to germinate.

Since the reed canary seeding starts slowly, it should not be pastured the first year. If weeds are troublesome, the field can be mowed without damaging the grass stand.

Fertilizer gives the young seeding a much-needed boost. A heavy application of fertilizer carrying potash and phosphorus, about 400 pounds of 0-9-27 and 0-20-20, will return dividends in more vigorous plants.

The pasture experts used to think that palatability was the biggest fault with reed canary grass. Practical experience has taught farmers two ways to increase the cow's appetite for reed canary.

First of all, the grass must be pastured closely. A common mistake is to let reed canary get a head start in the spring months. Livestock must get on the meadow early since it is off to a flying start by the middle of May.

Six to eight inches is an ideal height to keep the grass. When the heads are trimmed off and not allowed to develop, the grass sends up tender young shoots all during the summer. It is better to over-graze the pasture, than to let it become rank and coarse. If allowed to grow unchecked, reed canary will be up above the cow's back by the middle of July.

Fertilizer will increase the palatability as well as the yield of reed canary pasture. On test plots, livestock have been known to graze more heavily on the side

of the field where the application of fertilizer was made.

Up to 700 pounds of high potash and phosphorus fertilizers should be applied to each acre sometime during the year. It brings results, just as it does with row crops.

It must be remembered that muck soils are lacking in many mineral elements. While nitrogen is available, phosphorus and potash are sorely needed.

It's possible to use reed canary pasture in conjunction with upland grasses. Good management is necessary, though. If given their choice, cattle may grub down an upland pasture and let the reed canary pasture go to seed. One good procedure is to use the upland pasture during the night, and confine the cattle to the reed canary pasture in the daytime.

Contrary to accepted beliefs, reed canary makes a fine pasture for sheep, providing it is well-located. Unlike cattle, sheep can be allowed the choice of upland and reed canary pastures. They should not be confined to low, wet marshes for any length of time.

Even swine, especially sows that are being roughed through the summer, find reed canary a succulent feed.

It would seem that pasture for beef cattle would be an important use for this grass. However, Michigan ranks so low in the production of beef that this possibility has been overlooked.

Reed canary will produce from 150 to 200 days of pasture a year, from May straight through until October. In a recent survey on the comparative costs of various kinds of pasture, Michigan State College found that reed canary produced more days of pasture than any other grass or legume mixture now in use. And it cost the least of any of the grasses studied. Only 3.8 cents a day for each acre. Not bad when an acre can handle up to three cows.

Reed canary is one of the few useful plants that enjoys a good soaking under water. One pasture expert tells of seeing a herd of cows pasturing on reed canary while up to their knees in water. They fed on the grass as it came up through the surface, like so many water buffaloes.

Farmers were skeptical of reed canary at first, afraid that it would prove a noxious weed like quackgrass. But the grass can hold its own only in marshes, where it has plenty of moisture. On upland soils, it is poor competition for bluegrass.

Whether it can be plowed under and killed on muck ground has not yet been decided. Few farmers have had any inclination to try it, once they have the marsh seeded down to productive

pasture. It promises to be a hard job, judging from the characteristics of the grass. The constant presence of moisture allows the clump of sod to start growing immediately from the other side once you turn it over.

Making reed canary grass hay is another difficult operation. It takes a sharp sickle and a rugged mower to cut through the heavy damp grass. The ground is invariably moist under the swath and the hay dries slowly.

Judged from nutritive value, reed canary hay is about the equal of timothy. A good field will yield up to three tons to the acre. If it is cut as the heads are first appearing, reed canary has a protein content of 10 to 12 per cent, compared to 8 or 10 per cent for timothy.

The hay is good feed for horses, or cattle which are being roughed through the winter. When used to top out a stack of bales, or an open shed, reed canary sheds water like the proverbial duck's back.

Combining reed canary seed is the only practical way to harvest the crop. The seed will retail for approximately 85 cents a pound and a good field will yield 100 to 200 pounds of seed to the acre. But you quickly earn your money's worth combining reed canary seed.

The seed shatters as it ripens. A day or two either way makes all the difference in the world in the amount of seed harvested.

The seed comes from the combine wet and green. It must be spread out to dry and stirred regularly to prevent molding. Two weeks are usually required to dry the seed.

Meets All the Requirements

"A good pasture," the experts tell us, "should provide continuous summer growth—be resistant to drought—yield a big crop of succulent forage."

Reed canary is one of the few pasture grasses that can boast of doing all three things. It is ready to pasture in May and doesn't stop growing until a killing frost. With sub-surface irrigation, it laughs at dry weather and midsummer drought. As far as yields are concerned, one Livingstone County farmer pastures 33 head of cows on 12 acres.

Farmers all over the state are enthusiastic about the grass. One farmer put it this way:

"On my muck land the corn was always flooded out and the grain would never live through the spring months.

"Finally, I decided I had taken enough punishment. I bought some of the first reed canary grass seed brought into the state. Since that day, I haven't touched that land, except to fertilize it in the fall. And I've harvested a big crop every year.

Limited Feeding May Pay Some Feeders

Condensed from American Hampshire Herdsman

WHEN the supply of corn available for hog feeding is scarce or exceptionally high priced, the hog feeder is confronted with the problem of trying to secure a sufficient supply of corn at the high price prevailing, in order to keep pushing his pigs along, or feeding a limited grain ration on pasture during the summer and then finishing his hogs on the new corn crop. Several factors affect his decision.

Some of them are: the age of his pigs or whether they were farrowed early or late; the availability of corn or other suitable grain; the hog price trend; the type of business he conducts; that is, whether purebred with most of his crop sold as breeding stock or market hog production.

In most cases the man with early pigs should keep his pigs on full feed and aim to get them on the market before the big runs of hogs later in the season bring the prices down. The same is probably true for the purebred breeder selling at auction. However the man with late pigs may well consider the feeding of a limited ration until the new corn crop is ready and we cite the following experimental results obtained some few years ago at Kansas State College as good reason for such recommendation.

Two lots of 16 pigs each were used in the test. The initial weight of the pigs was 60 pounds on June 16.

One lot was self-fed shelled corn on good alfalfa pasture until September 28, a period of 104 days, by which time each pig had gained 170 pounds. They received with the corn each day, one-fourth round of tankage per head.

To compare with this lot, another group of 16 pigs with the same initial weight were put on feed the same day and hand-fed daily 1 pound of corn and one-fourth pound of tankage per pig on good alfalfa pasture. This initial period was 56 days and the pigs weighed about 100 pounds.

After this period the corn allowance was raised to one and one-half pounds, with the one-fourth pound of tankage per pig daily. This ration was fed for 48 days and the pigs weighed about 146 pounds.

At this time, they were allowed to run to salt feeders, they received an unlimited supply of corn, but the protein was retained

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at one-fourth pound daily. This finishing period necessitated 33 days, at the end of which time they were ready for market and weighed 240 pounds, the same as those in the lot receiving unlimited corn when they were marketed.

From this experiment it is shown that by limiting the amount of corn and tankage to fattening pigs on alfalfa pasture, it required 33 more days to finish them to the same weight as the full-fed grain pigs.

However, the amount of grain required for the feeding period was much less so that the limited fed pigs produced their gains at a lower cost. For each 100 pounds of gain there was a saving of 126.5 pounds of grain.

Another interesting point is the fine gains made by the pigs on the reduced protein allowance. The pigs receiving a full feed of corn and only one-fourth pound of tankage per head daily gained 1.63 pounds a day. This limiting of the tankage forced the pigs to get the rest of their protein from the alfalfa pasture and helped in a saving of protein, and consequently in the cost of gains.

Poor Soil — Less Beef

There's no longer any argument that feed crops grown on soils of low mineral content also lack minerals. And this can be serious for livestock.

At the Tennessee Agricultural Experiment Station two lots of 300-pound calves were carried on exactly the same growing ration, except for the forage. One lot was fed red clover hay containing nearly three times as much phosphorus as that fed the other group.

The calves getting the hay which had plenty of phosphorus to meet their growing requirements put on an average of 124 pounds of gain in a 196-day feeding period, as compared to only 79 pounds per head for the other group.

Besides the difference in weight, the calves on the phosphorus-rich hay developed much larger frames than those grown on the low-mineral forage.

Farm Journal

Creep Feeding for Calves

Condensed from The Hereford Journal

Phil W. Ljungdahl

CREEP-FEEDING of calves is a method of producing finished beef in the shortest time, with the least cost, and at a desirable weight, or developing young breeders cattle from purebred herds. The practice of supplementing the mother's milk with grain fed to the calf in a creep offers several advantages.

1. It adds weight. For each bushel of grain fed, 10 pounds of weight usually are obtained.

2. It adds finish. The degree of finish it adds depends upon the amount of grain fed.

3. It makes the calves more uniform, since calves that do not obtain as much milk from their mothers will eat more grain and thus overcome the disadvantage.

4. It saves shrink at weaning, as there is less radical change in switching the calves over to drylot feeding.

5. It permits earlier marketing as the drylot feeding period is shortened, due to the added finish and weight obtained by weaning time.

6. It reduces the amount of feed necessary to finish the calves.

7. It permits the heifers to be marketed at a weight when their carcasses are practically as desirable as the steers.

8. The cows will be in better flesh at weaning time as the calves do not worry them as much when they are being creep-fed.

Essentials in Creep Feeding

1. The calves must be of good beef type so they will fatten when young. To produce such calves requires the use of a good purebred bull and good cows of the same conformation.

2. The cows must be wintered well to raise a high percentage of calves to nurse them properly.

3. The calves should be early so they may be taught to eat grain before they go to grass with their mothers. Late fall, winter, or early spring calves are very desirable; calves born in the summer eat very little.

4. Creep-feeders should be placed in the pasture near the "loafing places" of the cows. This is usually near the watering place, or places. Salt often will assist in attracting cows to a certain location.

5. It is necessary to remember that calves should not only be given the privilege of eating, but that they may need to be per-

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suaded to eat by the convenient location of feeders containing a desirable feed.

After the calves are a few weeks old, they may be induced to eat more grain by keeping them separated from their mothers and allowing them to nurse twice daily. A small paddock, with shade, grain, and grass available is desired for the calves.

What to Feed the Calves

Any of the usual fattening grains may be fed to good advantage either separately or as a mixture. Calves start readily on whole oats, and it may be used as part of the ration in fattening calves. However, due to its bulk, it should not be used exclusively after the first two months if calves are to be fattened quickly.

The following fattening grains may be used: Corn—whole or ground; kafir—ground; barley—ground; wheat—ground, used as less than half the ration; oats—whole or ground, used as one-third of a fattening ration.

Protein supplements such as cottonseed meal, or soybean oil meal should be added when the cows slow down in their milk flow. About nine parts grain and one part protein supplemented by weight make a desirable mixture.

Creep-Feeding in the Pasture

Locate the creep-feeder where the cows loaf; usually if there is only one watering place, they will rest near it. If there are several watering places, it may be necessary to use several creep-feeders. The cows may rest in a shady place or on a breezy knoll during the hot part of the summer. Calves usually eat little during the forepart of the summer when the milk supply is abundant and grass is plentiful. It will help to locate the salt box close to the feeder.

Calves that know how to eat before they go to grass will adapt themselves to a pasture creep-feeder and teach younger calves. A small amount of bright alfalfa hay will help coax calves into the creep.

Pastures containing a lot of shade or having many watering places along a stream are the most difficult ones in which to creep-feed calves, and it may be necessary to shut calves into the creep each day or until they get to eating and will go there on their own account.

Early calves in a pasture well adapted to creep-feeding will eat about 10 bushels of grain by weaning time, or about one pound of grain daily for 100 pounds live weight during the latter part of the summer, depending upon the grass and the milk obtained. They usually will gain about two pounds a day under good conditions in the pasture and about one-fourth pound more when they are confined by feeding and

the cows turned in to nurse them twice daily.

Building the Feeder and Creep

To prevent feed waste, build a self-feeder with wide, overhanging eaves to keep out rain.

The throat of the grain opening should be adjustable so that only a little grain comes out as the calves eat it. A variation of one to four inches in the grain opening is required to handle whole grain and ground grain.

A self-feeder 10 feet long will handle 40 to 50 calves. If grain is fed daily, a bunk with a roof over it will be used.

The creep around the feeder should be at least 10 feet from the feeder on all sides. Make several openings in the fence by setting posts 16 inches apart and laying them together at the top to prevent the cows from crowding them apart. This space will allow a 600-pound calf to enter. Calves prefer to slip between posts rather than bend their backs to get under a low board.

Precautions to Be Observed

1. Never let the feeder get empty, as the calves will get hungry, and when the feeder is filled they will eat too much and get "off feed."

2. Never change the kind of feed suddenly.

3. Reduce the amount and hand feed the calves for a few days when they are changed from pasture creep-feeder to drylot full feed at weaning time; otherwise they will be nervous and overeat.

4. Keep the feed fresh removing any spoiled feed.

When Is It Desirable to Creep-Feed?

When you wish to obtain a marketable finish at the earliest time. Thirty bushels of grain usually will produce a 700 to 750-pound calf when about 10 months old if it is crowded on a creep feeder and put into the drylot for a short feed.

When you wish to even up the feeder calf crop, a few bushels of grain during the latter part of the summer will make them more uniform, save shrink at weaning, and make them start on feed easier.

When you wish to relieve the cow herd by feeding the calves.

When you wish to develop purebred bulls and heifers, a bulky grain in the creep-feeder will be desirable.

When you wish to take advantage of a fall market for good quality of finished beef, the early calf, creep-fed, can be marketed from three to five months earlier than the bulk of winter-fed cattle.

Champions Require Good Feeding

Condensed from Holstein-Friesian World

G. P. Walker

Extension Agronomist, Purdue University

As time goes on, great cows are developed and acclaimed for their high production records. Many of them are purchased and placed under as nearly ideal conditions as can be provided. With all due credit to these great cows, the true champions are those that make great records without involving large sums of money and under unpretentious conditions. Such a story is found on the dairy farm of Clark Dellinger, of Clark County, Indiana, the home of national and state record cows.

Among many interesting things found on this farm three stand out. One is that the herd is home bred. It had its beginning a number of years ago when, before he was twenty, Clark purchased a registered Holstein cow. While a few cows have been added at different times, the great majority have been bred on the farm. Most of the champion producing cows are the descendants of one great old cow and only one of about 200 registered Holsteins now in the herd was not born on this farm.

A second thing that stands out is the modest conditions in which such outstanding records have been made. The barns are unpretentious but practical. The feeding program is simple but a good one. It includes an excellent pasture program, pea green alfalfa hay, good silage and a simple grain mixture. The grain mixture is made up of 400 pounds soft starch ground corn, 200 pounds ground winter oats, 200 pounds home grown ground alfalfa hay, 200 pounds soybean oilmeal and 2% salt. This mixture, containing about 17% protein, is fed through the winter at the rate of one pound for each 3½ pounds of milk. Less is fed during the pasture season. The keys to this highly successful feeding program are the top quality roughage and the full feeding of the cows with palatable practical feeds.

The third outstanding feature of this farm is Clark's pasture program. He takes full advantage of his southern Indiana location to provide the most economical feed, good pasture, for as much

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of the year as possible. He starts in March with a short intensive grazing period on well fertilized August seeded Balbo rye. About April 1, the cows are moved to an old field of alfalfa that has partly gone to blue grass. Then they are shifted to a fertilized permanent blue grass pasture for about ten days. From this, they are transferred to the blue grass and white clover which, by this time, is in splendid shape. During the two weeks or so that the cows are on this mixture, Clark says they reach their greatest production. The rotational grazing is followed until late July when the animals are turned into corn pasture which has been drilled solid at about 35 lbs. per acre. Most Indiana dairymen use Sudan grass for this hot weather period but Clark uses corn to avoid any chance of possible prussic acid poisoning. He says the green corn seems to fill the cows quicker on hot days than anything he has tried.

Clark's object is to "keep the cows full of sweet, green lush grasses all the time as maximum production doesn't permit a cow to hunt for food." They are moved at about two-week intervals to keep the grasses green and fresh. Even while on pasture, the cows are given hay in the barn occasionally as they seem to relish it at times. The pastures are clipped to keep down weeds, cut off any tall spots that are getting tough, and let the new grass come on.

Lime — The Foundation of Soil Fertility

Condensed from American Agriculturist

George Serviss

Most northeastern soils were acid when first brought under cultivation. With cultivation they have become more acid unless needed lime has been applied. The more intensive the cultivation, the more rapid the increase in acidity. Even some soils that were not acid when cleared now have an acid topsoil.

Except for a few specialty crops like potatoes, blueberries, etc., acid soil farming is not conducive to success. Seldom are yields and quality as good as

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when the crops are grown on well-limed soils. Failure to use lime where it is needed often results in crop failure.

Lime may truly be called the foundation of soil fertility. Given a soil that is fit to farm—that is, has good drainage, enough depth, lays reasonably well and is sound physically—we first check it for lime. If the lime is not there, there is not very much use of proceeding any further until we add the needed lime to it.

Once we lay the lime foundation, we can then build on the rest of the soil fertility structure. The foundation required may be one ton, two tons, or three tons per acre. A soil test is the fastest and cheapest way to find out. We must not think, though, that once we apply the foundation lime we are through. Lime, like organic matter, must be constantly replenished. An average of about 400 pounds to the acre is carried to the sea in drainage water each year, and additional lime is lost by crop removal. In a feed crop rotation, one ton every four to five years is about right for maintenance. On fields devoted to the growing of cultivated crops nearly every year, more is likely to be needed.

For years lime was thought of solely as a neutralizer of soil acidity and therefore, also as a corrective for undesirable conditions accompanying soil acidity. It is now recognized to have actual fertilizing value as well, since it furnishes calcium and often magnesium, two essential plant foods.

Lime increases the efficiency of both fertilizer and native soil phosphates. This in itself is a very important reason for putting lime first in the development of a soil fertility program. It also increases the fixation of nitrogen by soil organisms, both those that live in the nodules on the roots of legumes and those that exist free in the soil. The more nitrogen that soil bacteria fix, the less commercial nitrogen has to be applied to maintain a given yield level.

Legumes will often grow, but seldom will thrive on soils containing too little lime, for the proper functioning of nitrogen fixing bacteria. Under such conditions they will deplete the nitrogen content of the soil rather than add to it. In fact, under such conditions they will show good response to applications of nitrogen fertilizers. It will usually be necessary, too, to apply more fertilizer potash, since potash can be utilized by the plant as a partial replacement for calcium. Obviously, the fertilizer program for a feed crop rotation becomes much more costly if yields are to be maintained with an inadequate supply of lime.

Farmers used to apply most of

the lime they used in the spring immediately before sowing the crop in the rotation needing it most. They are now applying it every month during the year that the ground is not frozen. Once a regular liming program has been established, the important thing is to get the lime on; actual time of application or place in the rotation is secondary. Lime benefits the entire rotation.

Where only a small part of the lime needed by the soil is being applied, then time and place become important. Under these conditions it should be localized as close to the seed of the crop having the highest lime requirement as possible. It is hard to justify this practice, though, except under special circumstances; for instance, where clover occurs in rotation with potatoes and lime has to be kept at a minimum in order to avoid scabby potatoes. Under these conditions, hydrated lime may be preferable to ground limestone, since hydrated acts quicker and goes out of the soil faster.

There are two general types of lime available, this applies to hydrated as well as ground limestone, high magnesium or dolomitic and high calcium. Magnesium deficiency definitely appears to be on the increase on the intensively cultivated soils of the Northeast, particularly potato soils that are kept very acid to control scab. Since not much lime is applied to these soils, what is applied should probably be magnesium lime. For vegetable crops in general, New Jersey recommends using high magnesium lime alternately with high calcium. For dairy farm rotations, except in areas where the soils are very low in magnesium, it probably does not make very much difference.

As important as lime is, we must remember that it is not complete in itself. We start with lime but we cannot end there. Along with it there must be adequate use of fertilizer and manures, control of erosion, crop rotation, replenishment of organic matter, etc. Adequate use of lime makes these other things easier and increases their effectiveness.

Don't Give Up on Grass

Condensed from Kansas Farmer

Dick Mann

Manhattan, Kansas

BRINGING 102,000 acres of barren crop and pasture land in Southwest Kansas back into production is being accomplished by the Federal Government. The experiment, known as the Morton County Land Utilization Project, has attracted national attention because of its possibilities for application over all of the former "dust-bowl" area of the Great Plains.

The story of the Morton County Land Utilization Project dates back to 1936. That year, under a provision of the AAA that allowed purchase of distressed land, the Federal Government took over 50,000 acres in the county. Nothing was done with the tract until 1938, when George Atwood, present project manager, came to Elkhart under the Bankhead-Jones Land Utilization Act, which provided for purchase and development of submarginal lands. Another 52,000 acres were purchased that year and preparations made for a regrassing project.

A Government survey of the area in 1938 disclosed that no usable grass could be found on the entire 102,000 distressed acres, and that surface soil was blowing badly. Condition of the area was reflected by prices paid for the land, which ranged from 50 cents to $6 an acre, including farmsteads. Land taken over was abandoned crop and pasture acreage that wasn't supporting either grain or livestock production.

Purpose of the land utilization project was to re-establish native grasses on the entire 102,000 acres and to make the grass available to local livestock men under controlled use. First preference on grazing rights was to go to those nearest the reclaimed land.

To make the task more difficult there was very little information available at that time on grass-seeding methods. Virtually no experimental work had been done by any of the experimental stations in the Great Plains area. There also was no native grass seed available for large-scale seeding. In fact, shortage of seed has handicapped the project every year since its start.

Despite these obstacles, the first grass seeding was done in 1939. That first year 569 acres

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were seeded on a purely experimental basis, using a cottonbox-type grass drill having a single disk furrow opener for about half the seeding. The rest was broadcast.

About half of the seeding was on a prepared cane cover. Black amber cane had been seeded in 1938, then was mowed and left for cover. The other half was seeded in an unprepared cover consisting mostly of pigweeds and more stable types of weeds. All seeding was done in April of 1939.

First grass mixture seeded consisted of blue grama (4 pounds), Galleta (2 pounds), sideoats grama (2 pounds), buffalo grass (1 pound), wild rye (2 pounds), and western wheat grass (2 pounds.) A desirable stand of all varieties but Galleta was obtained. This variety, which came from New Mexico and is similar to blue grama, was immediately dropped. Wild rye and western wheatgrass also were dropped from spring seedings but are used in fall seedings.

One thing learned by Mr. Atwood was not to give up too soon on his grass seedings. He had some plantings that first year that didn't show a year later and were listed as blown out. Now they have gone ahead without further seeding and are listed as "good" pasture.

No difference in stands was apparent between drilling and broadcasting the seed, Mr. Atwood reports. The advantage to drilling, he states, is even distribution of the seed and getting it at the right depth, which is about three-quarters inch.

By this fall more than 36,000 acres of native grasses will have been reseeded. Another 3,000 acres will be seeded this fall. It had been hoped that the entire project could be completed by 1949, but this will be impossible, because of limited seed supplies.

Seed for additional plantings now is being harvested on the project, however. Mr. Atwood has 1,000 acres of native grasses under cultivation for seed production only.

As the native grasses became established, some system of controlled grazing and management had to be found. This utilization of the grass is being carried out under the Morton County Grazing Association, which was organized May 29, 1944. A non-profit corporation, the association is composed of local livestock men who are operating the reclaimed land now and will continue its operation when the entire acreage is restored and turned back by the Government.

Local livestock men can become members of the association upon acceptance of their applications by the board and payment of $1. Memberships are non-

transferable and revert back to the association in case of death, withdrawal or removal of a member from the area.

Grazing permits are issued seasonally by the Government's project manager. Grazing is regulated by him and is based on constant observation of conditions. "We try to get maximum use of grass without hurting it," Mr. Atwood explains. "Our season usually starts from May 1 to May 15 and ends 6 months later. However, condition of the grass determines the length of the season. This year, for instance, permits are dated to end September 30, but the grass is so good now they may be extended to November 1, or later."

In cases where applications are made to graze more cattle than acreage or condition of grass will permit, the executive board prorates the allowable grazing numbers among members. During the first grazing season, 1944, a total of 4,746 animal units a month of grazing was obtained. This was boosted in 1945 to 7,814 animal units a month, and to 11,191 in 1946. Figures for this year are not complete.

Actual management of the Government pasture has been worked out carefully by the association and is followed closely. The 3-man executive committee has final authority on all problems but delegates most of the management to pasture bosses. One pasture boss is appointed for each pasture from among association members. These pasture bosses act as liason officers between members and the executive board. They handle complaints, supervise the rules and take care of all details not requiring board action.

Pastures have been divided so that one is set aside for heifers only, 2 for steers only, and 7 or 8 for cow herds. Members of the association voted to limit cow numbers to not more than 30 for each bull. Bulls are provided by individual owners of cows but must be registered and their quality passed on by a committee chosen by the board.

Refusing bulls is a touchy problem and presents the greatest source of possible trouble within the association. However, officers report that members have been usually co-operative. Altho 4 or 5 bulls have been rejected only one member has withdrawn in 4 years because of this ruling.

As a result of careful bull selection, definite improvement in quality has been obtained during the 4 years. Strict supervision over bulls used is paying off.

This year, 62 members are grazing about 3,000 head of cattle on pasture already re-established. Grazing fees are $1 a head a month. Forty cents of this goes to the Government and the as-

sociation retains 60 cents for expenses. Expenses include salt, fence and windmill repairs, water development, and the salaries of two full-time range riders. Of the 40 cents going to the Government, 10 cents stays in the county in lieu of taxes. The association now has added a fly-spraying outfit and all cattle will be sprayed. This means that fees will have to be raised some next year to cover the added cost of spraying.

In addition to the regular fees, as outlined, additional assessments are possible. Members by vote authorized the executive committee to make such additional assessments, if needed.

Developing water supplies for the cattle has been a problem. Ponds are not practicable in the area, Mr. Atwood points out, because of the low annual rainfall and high evaporation rates that prevail. Also, pipe and windmill materials have been difficult to get.

Best results have been obtained from windmills and scooped out reservoirs, fenced so cattle can approach from only one direction. These reservoirs are equipped with a concrete apron and barrier on the approach side so cattle can reach them in any kind of weather but cannot get into the water.

Windmill and fence repair, providing salt for the cattle, and other details of maintaining the stock in good condition are carried out by the two full-time hired range riders under supervision of the pasture bosses. Ground salt is kept in portable troughs mounted on skids.

Hundreds of thousands of acres could be handled to advantage under voluntary range management programs patterned after the Morton county association, believes Mr. Atwood.

Greatest obstacle to such action, he says, would be fear of community pasturing. "This fear mostly is unjustified," Mr. Atwood claims. The same fear was present in Morton county when the project started but since has been overcome. Some blackleg was experienced by the association one year but now everything is vaccinated.

Vaccination for Bang's disease is not generally practiced by the members. Calfhood and adult vaccination for Bang's is being practiced in only one of the Government pastures. No studies have been made to determine comparative losses in this and other pastures where cattle are not vaccinated.

Success of the Morton county experiment so far certainly has been outstanding. It is a real thrill to see 3,000 head of cattle grazing in an area that was completely barren 10 years ago. Yet these 3,000 cattle represent less than one-third of the eventual

grazing possibilities of the project.

Real test of the experiment will come when the completed project is turned back entirely to local control. Will association members have the necessary restraint to prevent overgrazing? Only time will tell. If they do have, they may be setting the pattern for a new era of long-time prosperity in the Great Plains area.

Deep Litter Saves Labor

Condensed from Everybody's Poultry Magazine

Paul F. Worcester

THERE are about as many ways to handle litter as there are poultrymen, but for the common every-day chicken man who wants a sure-fire litter system which will hold labor to a minimum, keep pen floors dry, and use as little new litter material as possible, built-up litter, with clean, fresh litter put in when pullets are housed and left in until the pens are emptied, is hard to beat.

Many poultrymen have followed the plan for years and many others have been intending to try it but succumb to the old urge to clean the house just when the litter begins to get broken up right. If these poultrymen would think of these cold February days when their strawy litter is frozen in the morning and sopping wet at noon, maybe they could keep their hands off the pitchfork, shovel, and scraper. There is a big saving in labor and litter materials when you clean pens only once a year, it's true, but warm, dry floors all winter are important.

Let's see why floors get wet. Obvious causes are leaky roofs and walls, spillage around waterers, and moisture from droppings. No litter system in the world can keep litter dry if the roof leaks, but deep litter will absorb moisture from droppings quickly, then gradually release that moisture so it can be carried off through air outlets. There are other causes of wet litter, too. Condensation is one. Just as droplets of water form on the inside of a window on a cold day, moisture condenses on cold floors in laying pens. Capillary action, which forces ground moisture up through concrete floors also causes floors to be

Reprinted by permission from Everybody's Poultry Magazine, July-Aug., 1947
Hanover, Penna.

sticky, but isn't often much of a problem.

Straw is the most common litter material, but it is almost worthless when it comes to soaking up moisture unless it is finely chopped or broken up. Coarse straw doesn't stop condensation, either. When straw is put in the pens in late summer, birds have a chance to break it up before wet litter is a problem. Shavings, ground corncobs, marsh grass, oat or rice hulls, peat moss, shredded sugar cane, and other materials work the same way. The 6- or 8-inch layer of droppings and litter formed by the time cold weather sets in acts like a sponge and an insulator combined. The sponge effect is to absorb moisture from droppings quickly, then release it as it can be caried off in the air. The insulation effect keeps the moisture in the air from condensing on the cold floor and keeps any water that works up by capillary action from getting near enough to the surface to make the litter wet.

Although straw alone can be worked up to make the fine base needed, most poultrymen find that shavings or some other material which is already fine should be used under the straw when birds are housed. Ground corncobs are all right, but they have to be bone dry and must be kept dry to keep mold from developing. Unless you can get kiln-dried screened cobs, it's a good bet to steer clear of them, particularly for chick litter.

Start your built-up litter by putting about 2 inches of fine material on the floor before pullets are housed. As soon as they are used to living on litter, start adding straw, a little at a time. Feed at least part of the grain in the litter to encourage the birds to scratch and speed the breaking-up process. Birds face the light and scratch to the rear, so most of the litter will end up at the back of the pen unless you pull it forward with a fork every day or two. Some houses have floors laid with a slope to the front to help keep the litter level.

As fast at the litter material is broken into inch-long pieces, add more, getting the litter at least 6 inches deep by the time cold weather sets in. From then on add nothing; the droppings will increase the depth as winter goes on. In most houses, birds throw water around the fountains and it is necessary to remove the wet litter that results. If there is so much of this spillage that litter gets wet frequently, and if you can't correct it, you may have to add some straw to keep the litter depth above the 6-inch minimum.

Restrict ventilation as weather gets cold and the air will keep warmer—and thus be capable of carrying off more moisture. If

litter does get damp, don't clean it out. Add lime to get it dry again. Scatter the lime over the floor, stirring it into the litter as it is put on. Working in one side of the house at a time will let you do the job without disturbing the birds too much. A pound of lime for each bird housed should be used on each application.

The use of deep litter for more than one flock of pullets has been tried on many poultry farms and at some colleges with good results. This practice is not recommended when there has been any serious disease outbreak, however.

A Maryland poultry raiser, N. H. Randers-Pehrson, has an interesting system of litter management. He mixed limestone and sawdust as a base, then added old compost, rotted manure, and top soil. After using this on his floors he put some of the compost in his droppings pits. Aside from adding a little lime, nothing has been done for three years except to remove the litter when it is needed for the garden, when a customer comes, or when it gets too deep.

On a recent visit we scooped up a double handful of droppings, fresh from the pits, compressed them into a ball, then brushed off our hands. They were as clean as they would have been had we picked up a handful of moist loam from the garden. The litter is dark, rather spongy in texture, extremely absorbent, and has no odor of ammonia. Although this system goes only one step beyond the plan of carrying the litter over from year to year, and even though we have seen it, we would like to see it tried on several other farms before recommending it. It works all right on this farm but seems almost too simple and easy—there must be a catch to it somewhere.

Some of these systems are far removed from bi-weekly cleaning, and whether they work out on commercial farms over a period of years remains to be seen. But the deep litter system has already proved itself and the savings in labor and litter and more comfortable conditions in the pen certainly make it worth a trial on any practical poultry farm.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.50.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $4.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.50.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.50.

Diseases and Parasites of Poultry—By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75

Domestic Geese and Ducks—By Paul F. Ives, American Waterfowl Ass'n. Orange Judd Publishing Co. $3.50.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.50.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ.. Morrison Press. $6.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.50.

Hunger Signs in Crops—Published by The American Society of Agronomy and The National Fertilizer Review. Again available. Limited Edition. $3.00.

Land for the Family—A Guide to Country Living—By A. F. Gustafson, E. V. Hardenburg, E. Y. Smith, and Jeanette McCoy—N. Y. State College of Agriculture. Comstock Publishing Co. $4.00.

Livestock Judging Handbook—By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husbandry, Univ. Idaho. The Interstate Printers. $3.25.

Making Pigeons Pay—By Wendell M. Levi, formerly Pigeon Section, U.S.D.A. Signal Corps. Orange Judd Publishing Co., Inc. (1946). $2.50.

Natural Principles of Land Use—By Edw. H. Graham, Chief of Biology Div., Soil Conservation Service. Oxford University Press. $3.50.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., formerly U. S. Dept. of Agric. Orange Judd Pub. Co. $4.50.

Pay Dirt—Farming and Gardening with Composts—By J. I. Rodale. Devin-Adair Co. (1945). $3.00.

Pleasant Valley—By Louis Bromfield, author, farmer, conservationist. Harper & Brothers. $3.00.

Practical Farming for the South—By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penna. State College. Orange Judd Publishing Co., Inc. $3.00

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $2.25.

Weeds of Lawn and Garden—By John M. Fogg, Jr., Prof. of Botany, University of Pennsylvania. Univ. of Penn. Press. $2.50.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

"We do not need more material development; we need more spiritual development. We do not need more intellectual power; we need more moral power. We do not need more knowledge; we need more character. We do not need more government! we need more culture. We do not need more law; we need more religion. We do not need more of the things that are seen; we need more of the things that are unseen. All of our learning and science, our culture and our arts will be of little avail unless they are supported by high character. Unless there be honor and truth and justice, unless our material resources are supported by moral and spiritual resources, there is no foundation for progress. A trained intelligence can do much but there is no substitute for morality, character and religious convictions. Unless these abide, American citizenship will be found unequal to its task."

—Calvin Coolidge